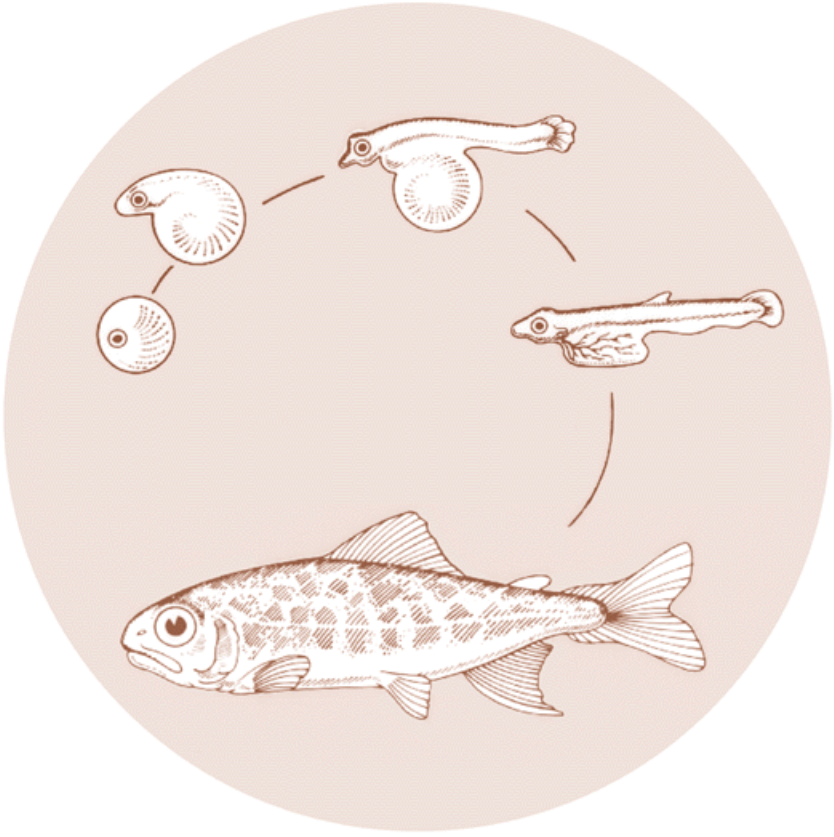
July 1990

ASSESSMENT OF PRESENT ANADROMOUS FISH PRODUCTION FACILITIES IN THE COLUMBIA RIVER BASIN

Idaho Department of Fish and Game Hatcheries

Final Report



DOE/BP-98379-2

This report was funded by the Bonneville Power Administration (BPA), U.S. Department of Energy, as part of BPA's program to protect, mitigate, and enhance fish and wildlife affected by the development and operation of hydroelectric facilities on the Columbia River and its tributaries. The views of this report are the author's and do not necessarily represent the views of BPA.

This document should be cited as follows:

Michael R. Delarm, Smith, R. Z., National Marine Fisheries Service, Assessment of Present Anadromous Fish Production Facilities in the Columbia River Basin, 1990, Final Report to Bonneville Power Administration, Portland, OR, Contract DE-AI79-89BP98379, Project 89-045, 96 electronic pages (BPA Report DOE/BP-98379-2)

This report and other BPA Fish and Wildlife Publications are available on the Internet at:

http://www.efw.bpa.gov/cgi-bin/efw/FW/publications.cgi

For other information on electronic documents or other printed media, contact or write to:

Bonneville Power Administration
Environment, Fish and Wildlife Division
P.O. Box 3621
905 N.E. 11th Avenue
Portland, OR 97208-3621

Please include title, author, and DOE/BP number in the request.

ASSESSMENT OF PRESENT ANADROMOUS FISH PRODUCTION FACILITIES IN THE COLUMBIA RIVER BASIN

Idaho Department of Fish and Game Hatcheries

Final Report

Prepared by:

Michael R. Delarm
Robert Z. Smith

National Marine Fisheries Service

Prepared for:

U.S. Department of Energy
Bonneville Power Administration
Environment, Fish and Wildlife
PO Box 3621
Portland, Oregon 97208

Project No. 89-045
Contract No. DE-AI79-89BP98379

July 1990

ABSTRACT

The goal of this report is to document current production practices for hatcheries which rear anadromous fish in the Columbia River Basin and to identify those facilities where production can be increased.

A total of 85 hatchery and satellite facilities operated by the IDFG, ODFW, USFWS, WDF, and WDW were evaluated. The years 1985 to 1987 were used in this evaluation. During those years, releases averaged 143,306,596 molts weighing 7,693,589 pounds.

A total of 48 hatchery or satellite facilities were identified as having expansion capability. They were estimated to have the potential for increasing production by an 84,448,000 molts weighing 4,853,306 pounds.

ACKNOWLEDGMENTS

This project has been a time consuming endeavor that has taken over two years from the initial discussions to complete. It could not have been completed without the cooperation of the various fisheries agencies, tribes, Bonneville Power Administration, and others interested in improving the runs of anadromous fish in the Columbia Basin. We wish to thank all who contributed by providing data and/or comments concerning the many drafts. We also wish to recognize the agency personnel who provided the raw data and helpful suggestions that went into this report. They were:

Tom Rogers, Idaho Department of Fish and Game
Tim Walters, Oregon Department of Fish and Game
Tom Sheldrake, U.S. Fish and Wildlife Service
Jim Gearheard (retired), Washington Department of Wildlife
John Kerwin, Washington Department of Wildlife
Mark Kimbel, Washington Department of Fisheries

A special thanks to Gary Henderson of the National Marine Fisheries Service for drawing many of the hatchery site plans included throughout this report.

TABLE OF CONTENTS

INTRODUCTION

The Pacific Northwest Electric Power Planning and Conservation Act, 1980 (16 U.S.C. 839, PL 96-501) passed by Congress, designated for the first time that fish and wildlife resources in the Columbia Basin should receive equitable consideration with power and other water users in resource allocation. The Act called for appointment of a council to guide the regions resource decisions and the resultant Northwest Power Planning Council (NPPC) was formed. The subsequent Fish and Wildlife Program (FWP) was designed to restore anadromous fish resources to previously abundant numbers. The Bonneville Power Administration (BPA), as the federal entity responsible for marketing much of the electrical power produced in the Northwest, is the principle source for funding of the FWP.

The interim goal of the NPPC is a doubling of the anadromous fish run produced in the Columbia Basin. To achieve this goal will require a mix of natural and artificial production. This report is designed to be used in conjunction with sub-basin plans currently being developed by the fishery agencies. In this report, policy and management personnel are being provided with sufficient information to allow informed decisions with regard to artificial production.

To aid in the implementation of the FWP, the NPPC set up Technical Work Groups (TWG) for coordinating and recommending fisheries research. The Hatchery Effectiveness TWG included a hatchery capacity evaluation as a high priority in their five year research plan. This resulted in BPA funding this hatchery capacity evaluation entitled "Assess Present Anadromous Fish Production Facilities in the Columbia River Basin."

In addition to documenting current production practices, the goal of this evaluation is to identify hatcheries where production can be increased by one of the following methods; increase funding only, provision of additional water to existing facilities, or provision of additional pond space and/or water. Implementation of the last two also assume there is room for expansion, the potential for developing additional water supplies is good, and adequate operation and maintenance funding are available. This information is required to effectively evaluate options for expansion of existing hatcheries or construction of new ones which can easily cost 20 to 30 million dollars each.

This anadromous hatchery capacity evaluation was designed to summarize information and data which the fishery agencies were already collecting and had readily available. The evaluation was not designed to fill gaps in existing information or to create a multiple year study. Information gathered in a previous report to BPA titled "Survey of Artificial Production of Anadromous Salmonids in the Columbia River Basin" was utilized where applicable (Washington 1985).

The 1985 to 1987 juvenile release years were chosen for evaluation

in this report. These years were chosen because 1987 was the last year data had been finalized by each agency when this process began and three complete years of information were required. Only data on public facilities have been summarized. No information is included for private facilities such as Sea Resources in Washington or Clatsop Economic Development Commission in Oregon.

The National Marine Fisheries Service (NMFS), Environmental and Technical Services Division, in Portland, Oregon, volunteered to coordinate this evaluation and provide the final report. State and federal fishery agencies responsible for operating anadromous fish hatcheries in the basin supplied the data and reviewed this report for accuracy.

The operating agencies should be contacted to obtain additional information on hatchery operations not provided in this report. Appendix "A" provides addresses and phone numbers for each agency. The following agencies operate anadromous hatcheries in the Columbia Basin and supplied data:

1. Idaho Department of Fish and Game (IDFG)
2. Oregon Department of Fish and Wildlife (ODFW)
3. United States Fish and Wildlife Service (USFWS)
4. Washington Department of Fisheries (WDF)
5. Washington Department of Wildlife (WDW)

The 5 agencies operated a total of 85 hatcheries and satellite facilities devoted to rearing anadromous fish (Table 1). Hatcheries are described as facilities operated year round while satellites are only operated part of the year and are managed by personnel from a parent hatchery. These facilities are located in the states of Oregon, Washington, and Idaho Tables 2 to 6). Releases from these hatcheries averaged 143,306,596 smolts weighing 7,693,589 pounds during the three years evaluated (Table 7).

Table 1. Number Of Hatcheries And Satellite Facilities Rearing Anadromous Fish In The Columbia Basin And Included In This Evaluation, By Agency.

Agency	Number	Location
IDFG	9	Idaho, Oregon
ODFW	29	Oregon
USFWS	14	Oregon, Washington, Idaho
WDF	16	Washington
WDW	17	Washington
Total	85	

Table 2. Anadromous Fish Hatcheries And Juvenile Satellite Facilities Included In This Evaluation Operated By The Idaho Department Of Fish And Game In The Columbia River Basin.

Hatchery	Location In Columbia Basin	Closest Town
Magic Valley	Snake River Basin	Filer, Id
McCall	Snake River Basin	McCall, Id
Niagara Springs	Snake River Basin	Wendell, Id
oxbow	Snake River Basin	Oxbow Dam, Or.
Pahsimeroi	Snake River Basin	Ellis, Id
Powell Satellite *	Snake River Basin	
Red River Pond *	Snake River Basin	Elk City, Id
Rapid River	Snake River Basin	Riggins, Id
Sawtooth	Snake River Basin	Stanley, Id

* Will be operated as satellite facilities to the Clearwater Hatchery when it is completed in 1992.

Table 3. Anadromous Fish Hatcheries And Juvenile Satellite Facilities Included In This Evaluation Operated By The Oregon Department Of Fish And Wildlife In The Columbia River Basin.

Hatchery	Location In Columbia Basin	Closest Town
Big Creek	Below Bonneville Dam	Astoria, Or.
Bonneville	Below Bonneville Dam	Cascade Locks, Or.
Gnat Creek	Below Bonneville Dam	Clatskanie, Or.
Trojan Ponds *	Below Bonneville Dam	Clatskanie, Or.
Klaskanine	Below Bonneville Dam	Astoria, Or.
Sandy	Below Bonneville Dam	Sandy, Or.
Clackamas	Willamette Basin	Estacada, Or.
Leaburg	Willamette Basin	Leaburg, Or.
Marion Forks	Willamette Basin	Idanha, Or.
McKenzie River	Willamette Basin	Springfield, Or.
Roaring River	Willamette Basin	Albany, Or.
South Santiam	Willamette Basin	Sweet Home, Or.
Aumsville Ponds *	Willamette Basin	Aumsville, Or.
Stayton Pond	Willamette Basin	Stayton, Or.
Willamette	Willamette Basin	Oakridge, Or.
Dexter Pond *	Willamette Basin	Lowell, Or.
Cascade	Bon. Dam to Snake River	Cascade Locks, Or.
Irrigon	Bon. Dam to Snake River	Irrigon, Or.
Oak Springs	Bon. Dam to Snake River	Maupin, Or.
oxbow	Bon. Dam to Snake River	Cascade Locks, Or.
Herman Cr. Ponds *	Bon. Dam to Snake River	Cascade Locks, Or.
Wahkenna Pond *	Below Bonneville Dam	Cascade Locks, Or.
Round Butte	Bon. Dam to Snake River	Madras, Or.
Pelton Ladder	Bon. Dam to Snake River	Madras, Or.
Lookingglass	Snake River Basin	Palmer Junction, Or
Imnaha Pond	Snake River Basin	Imnaha, Or.

Table 3. Continued

Hatchery	Location In Columbia Basin	Closest Town
Wallowa	Snake River Basin	Enterprise, Or
Big Canyon Ponds *	Snake River Basin	Minam, Or.
Little Sheep Cr Pd*	Snake River Basin	Imnaha, Or.

* Operated as Satellite Facilities

Table 4. Anadromous Fish Hatcheries And Juvenile Satellite Facilities Included In This Evaluation Operated By The U.S. Fish And Wildlife Service In The Columbia River Basin.

Hatchery	Location In Columbia Basin	Closest Town
Abernathy SCTC	Below Bonneville Dam	Longview, Wa.
Eagle Creek NFH	Willamette Basin	Estacada, Or.
Carson NFH	Bon. Dam to Snake River	Carson, Wa.
Little White Sal.	Bon. Dam to Snake River	Cook, Wa.
Willard NFH	Bon. Dam to Snake River	Cook, Wa.
Spring Creek	Bon. Dam to Snake River	Underwood, Wa.
Big White Pond *	Bon. Dam to Snake River	Underwood, Wa.
Warm Springs NFH	Bon. Dam to Snake River	Warm Springs, Or.
Entiat NFH	Col. Basin above Snake R.	Entiat, Wa.
Leavenworth NFH	Col. Basin above Snake R.	Leavenworth, Wa.
Winthrop NFH	Col. Basin above Snake R.	Winthrop, Wa.
Dworshak NFH	Snake River Basin	Ahsahka, Id.
Kooskia NFH	Snake River Basin	Kooskia, Id.
Hagerman NFH	Snake River Basin	Hagerman, Id.

* Operated as a Satellite Facility

Table 5. Anadromous Fish Hatcheries And Juvenile Satellite Facilities Included In This Evaluation Operated By The Washington Department of Fisheries In The Columbia River Basin.

Hatchery	Location In Columbia Basin	Closest Town
Cowlitz Salmon	Below Bonneville Dam	Salkum, Wa.
Elokomin	Below Bonneville Dam	Cathlamet, Wa.
Grays River	Below Bonneville Dam	Grays River, Wa.
Weyco Pond *	Below Bonneville Dam	Grays River, Wa.
Kalama Falls	Below Bonneville Dam	Kalama, Wa.
Lower Kalama	Below Bonneville Dam	Kalama, Wa.
Lewis River	Below Bonneville Dam	Woodland, Wa.
Speelyai	Below Bonneville Dam	Ariel, Wa.
Toutle	Below Bonneville Dam	Toutle, Wa.
Washougal	Below Bonneville Dam	Washougal, Wa.
Klickitat	Bon. Dam to Snake River	Glenwood, Wa.
Priest Rapids	Col. Basin above Snake R.	Mattawa, Wa.
Ringold Salmon Pond	Col. Basin above Snake R.	Mesa, Wa.
Rocky Reach	Col. Basin above Snake R.	E. Wenatchee, Wa.
Wells Salmon	Col. Basin above Snake R.	Pateros, Wa.
Lyons Ferry Salmon	Snake River Basin	Lyons Ferry, Wa.

* Operated as a Satellite Facility

Table 6. Anadromous Fish Hatcheries And Juvenile Satellite Facilities Included In This Evaluation Operated By The Washington Department Of Wildlife In The Columbia River Basin.

Hatchery	Location In Columbia Basin	Closest Town
Beaver Creek	Below Bonneville Dam	Cathlamet, Wa.
Cowlitz Trout	Below Bonneville Dam	Winlock, Wa.
Gobar Pond	Below Bonneville Dam	Kalama, Wa.
Skamania	Below Bonneville Dam	Washougal, Wa.
Vancouver	Below Bonneville Dam	Vancouver, Wa.
Chelan PUD	Col. Basin above Snake R.	Chelan Falls, Wa.
Naches	Col. Basin above Snake R.	Naches, Wa.
Nelson Springs *	Col. Basin above Snake R.	Naches, Wa.
Ringold Trout Pond	Col. Basin above Snake R.	Mesa, Wa.
Turtle Rock	Col. Basin above Snake R.	E. Wenatchee, Wa.
Wells Trout	Col. Basin above Snake R.	Pateros, Wa.
Yakima Trout	Col. Basin above Snake R.	Yakima, Wa.
Lyons Ferry Trout	Snake River Basin	Lyons Ferry, Wa.
Cottonwood Pond *	Snake River Basin	Asotin, Wa.
Tucannon Hatchery *	Snake River Basin	Pomeroy, Wa.
Curl Lake *	Snake River Basin	Pomeroy, Wa.
Dayton Pond *	Snake River Basin	Dayton, Wa.

* Operated as Satellite Facilities

Table 7. Summary Of Smolt Releases Made Fran Hatcheries Rearing Anadromous Fish In The Columbia River Basin.

Agency	1985		1986		1987		3 Year Average	
	Numbers	Pounds	Numbers	Pounds	Numbers	Pounds	Number	Pounds
IDFG	6,068,894	462,324	5,863,152	507,768	8,562,600	728,210	6,831,549	566,101
ODFW	36,566,439	2,211,795	42,703,334	2,202,552	46,593,424	2,350,680	41,954,399	2,255,009
USFWS	21,153,938	1,409,515	35,422,782	1,974,484	30,632,436	1,960,689	29,069,719	1,781,563
WDF	53,938,979	2,197,389	66,098,677	2,464,092	63.171.986	2,283,541	61,069,881	2,315,007
WDW	4,167,312	707,050	4,286,585	723,524	4,689,249	897,153	4,381,049	775,909
TOTAL	121,895,562	6,988,073	154,374,530	7,872,420	153,649,695	8,220,273	143,306,596	7,693,589

The objectives of this report are to identify production constraints and expansion capabilities at existing hatcheries. It is expected that management and policy personnel for the fishery agencies, tribes, BPA, and NPPC will utilize this document in their planning process to meet the goal of doubling the run of anadromous fish into the Columbia River Basin.

Data Collection Forms

Information used in this report was compiled in data collection forms completed by the operating agencies. The summery tables in the individual agency sections summarize data submitted on the collection forms. Blank copies of the data collection forms are presented in the appendix.

The data collection forms were divided into 3 parts as follows:

Part I. Existing Capacity: Includes basic information for all public hatcheries rearing anadromous fish within the Columbia Basin. It includes location, water supply, physical layout, staffing, operation costs, production numbers, adult returns, and production constraints. It also includes the agency production goal for each facility. Data collection forms 1.1 to 1.9 are included in this section.

Form 1.1, Hatchery Summary: This form identifies the hatchery or satellite facility, funding agency, initial year of operation, facility and operational synopsis, etc.

Form 1.2, Site Data: This form identifies hatchery location, legal covenants and conditions, and water rights held.

Form 1.3, Water Supply Summary: This form identifies water sources used in the hatchery for fish culture. It identifies the high, low, and average flow and temperature of water available for use that the delivery system is capable of supplying. If hatchery has water re-use system it is described.

Form 1.4, Facility Inventory: Lists rearing units at the hatchery by incubation, starter tanks, raceways, and ponds. It includes pond dimensions, volume, age, condition, etc. A schematic drawing of the hatchery is also attached.

Form 1.5, Staffing Summary: Lists staffing needed to operate hatchery.

Form 1.6, Adult Capturing/Handling: Completed if adults are captured and spawned. This form relates to form 1.7. One copy of this form should be provided for each form 1.7 that identifies releases from eggs taken. Brood year information provided in this form corresponds to egg take and release year data in form 1.7. As an example, yearling spring chinook released in spring 1985 (form 1.7) would have a corresponding

form 1.6 for brood year 1983 since this brood year led to the release. Egg take information on form 1.7 would also be for brood year 1983.

Form 1.7, Hatchery Production: identifies releases for years 1985 to 1987. A separate form is required for each year. Egg take information corresponds to brood year for fish released. This form relates to form 1.6.

Form 1.8a, Hatchery Production Summary for Fiscal Years 1985 to 1987: Summarizes release information from form 1.7 and also identifies interim production. Interim production is identified as fish reared for a period of time and transferred to other stations. The other stations receive credit for these fish when released. No attempt has been made to track transferred fish. A separate form for each year is provided.

Form 1.8b, Hatchery Production Summary For Fiscal Years 1985 to 1987. Summarizes releases and transfers to obtain total hatchery production. Also identifies operating cost by fiscal year. A separate form is provided for each of the three production years.

Form 1.9, Production Constraints: Identifies factors which may be limiting production or affecting smolt quality. Also identifies problems and areas needing upgrading, rehabilitation, or replacement.

Part II. Theoretical Capacity: Theoretical capacity for each facility included in Part I is calculated using flow and density methodologies described in Piper et al (1982) and is identified in form 2.1. The following formulas were used:

Flow Method: $W = F \times I \times L$ Density Method: $W = D \times V \times L$

W = Weight of fish in pounds
F = Flow Index
L = Length of fish in inches
I = Water inflow in gallons per minute
D = Density Index
V = Volume of rearing unit in cubic feet

The flow index was taken from the table on page 69 of Piper (1982) and varies depending on water temperature and elevation. The density index was assigned by agreement of all agencies prior to compiling the information. The remaining variables are easily obtained from hatchery records. Different density indices were used for raceway type rearing units and large ponds. The definition of a large pond was left up to the individual agencies but is basically large ponds having poor flow patterns and long turnover rates. It should be kept in mind that no one or two

density indices can be expected to fit all the various rearing facilities currently in use. The density indices assigned to each species are shown in Table 8.

Table 8. Density Indices Assigned To Each Species Used To Calculate Theoretical Production Based On Density.

Species	Raceways/Small ponds	Large Ponds
Fall Chinook	.3	.03
Coho	.3	.03
Spring Chinook	.25	.03
Steelhead	.25	.03

Part III. Expansion Capability: Includes an estimate of expansion capability at existing facilities. The basis for expansion and the relevant information are detailed in form 3.1. Costs are not included in this report because in most cases they are little more than guesses. In most cases additional engineering studies are required before accurate costs can be determined.

INDIVIDUAL HATCHERY REPORTS

The main body of this report consists of detailed information for each hatchery and is divided into individual agency sections. Each hatchery discussion is divided into 4 parts: Introduction, Current Production Constraints, Theoretical Production, and Hatchery Expansion Capability. Each part is described briefly below.

Introduction

Includes a brief description of hatchery location, rearing facilities, operations, and water rights.

Current Production Constraints

Contains information identifying areas constraining production in the existing facilities. It also identifies general problem areas which are affecting smolt quality, adult survival, egg take, etc.

Theoretical Production

This section calculates 2 theoretical capacity levels, one based on flow and one based on density. A brief comparison is made between these two calculations, average production for the 3 years evaluated, and the agency production goal. Throughout the report theoretical capacity and theoretical production are used interchangeably.

Determining the theoretical capacity of a facility is a difficult and elusive concept. There is no single theoretical capacity figure as it will vary each time the species or size at release goal changes. Since size of fish in inches is a variable in the theoretical formulas, by simply changing the species reared or size at release will change the hatcheries theoretical capacity by 50% to 100%. As an example, changing production from fall chinook (3.5 to 4 inch smolts) to coho, steelhead, or spring chinook (5.5 to 8 inch smolts) can double the theoretical capacity in pounds of a facility.

No single set of criteria can be applicable to all hatcheries when attempting to determine theoretical calculations. The formulas used cannot account for the large number of physical and chemical variables which differ from hatchery to hatchery. In addition, recent research has shown that reduced densities may in fact produce as many or more adults over higher densities at least with some species and stocks. While theoretical calculations may provide you with a number which can be physically held and reared, it may or may not have any bearing on increasing adult survival or producing more adults, which is the ultimate goal. As such, production based on theoretical calculations is probably more

applicable to commercial trout producers or catchable trout programs where survival of juveniles in the wild to adults is not a factor.

Theoretical calculations can provide a production starting point with a new hatchery, but actual capacity must be adjusted as the agency gains experience with the facility and adult returns are analyzed.

The theoretical calculations in this report have only been used as a gross comparison to determine if rearing space is in balance with water supply. In cases where the result of the 2 theoretical calculations differ by a large amount, the assumption is made that *one or* the other (water supply or rearing space) is the limiting factor in production potential. As an example, if the flow method identifies 100,000 pounds can be produced and the density method shows 300,000 pounds it would indicate that additional production may be possible if additional water could be provided. It does not mean that 200,000 pounds more could be produced given additional water. The numbers generated by these 2 formulas are not meant to be absolute and are not to be *used* as identifying *or* quantifying what an anadromous hatchery can successfully produce.

Hatchery Expansion Capability

This section identifies the land area, potential water supplies, and provides estimates of possible production increases. Each hatchery operated by the individual agencies is discussed in it's respective section. Tables are provided in each agency section which identifies the facilities with the most potential for production increases. The operating agencies were responsible for determining which hatcheries have expansion capability.

The ODFW is currently conducting *research* into the potential applications of providing an oxygen supplementation system in a hatchery. It will be several years before results from this research provides needed information. If oxygen supplementation is proven effective there may be additional expansion capability which has not been identified in this report.

At several hatcheries, WDF is proposing small scale *experimental* net pen rearing near the mouths of tributary streams. This experimental net pen rearing has been identified as potential expansion capability in this report. If net pen rearing is proven successful there may be additional expansion capability which has not been identified in this report.

The four constraints identified in this report are defined as follows:

Budget: Identifies those facilities where production is set by budget level. If additional funding could be provided, then production could be increased with existing rearing

space and flows.

Flow: Identifies those facilities where production could be increased by providing additional water to existing rearing ponds. The likelihood that additional water can be found is good.

Rearing Space: Identifies those facilities where production could be increased by providing additional rearing ponds. Space for expansion is available and existing water supply will support additional rearing ponds.

Flow and Rearing Space: Identifies those facilities where production could be increased by providing additional water and rearing ponds. These facilities have space for expansion and a high probability of adequate water supplies to operate them. It also includes those facilities needing major renovation or complete rebuild to more efficiently utilize available water supplies.

The increased production identified *in* this report should be used as only a general indication of expansion capability. In many cases numbers provided are very preliminary and are based on various assumptions. In most cases, additional detailed evaluation is required for those facilities identified as having expansion potential. Only those facilities deemed by policy and management personnel as capable of meeting future production goals based on hatchery location and species which can be reared should receive additional evaluation. This phase 2 study should include engineering, feasibility study, and estimated cost. An updated estimate of the potential production increase should also b**e** provided based on this phase 2 study.

Hatchery expansion capability has been identified as 84,448,OOO smolts weighing 4,853,306 pounds from existing hatcheries or satellite facilities (Table 9). These facilities are located throughout the Columbia Basin and as described above require a wide range of actions to accomplish. It is left up to policy and management personnel to determine which facilities can best meet future goals.

Table 9. Hatchery Expansion Capability For Each Agency Operating Anadromous Fish Hatcheries In The Columbia River Basin.

Agency	Number of Facilities	Production Increases Numbers *	Pounds *
IDFG	4	7,000,000	359,500
ODFW	9	9,492,000	662,583
USFWS	10	12,930,000	546,755
WDF	14	46,865,OOO	1,923,135
WDW	11	8,161,OOO	1,361,333
Total	48	84‘448,000	4,853,306

* Numbers and pounds of fish used are those recommended by operating agencies. Numbers and pounds will change if species and/or size of smolts is changed.

IDAHO DEPARTMENT OF FISH AND GAME

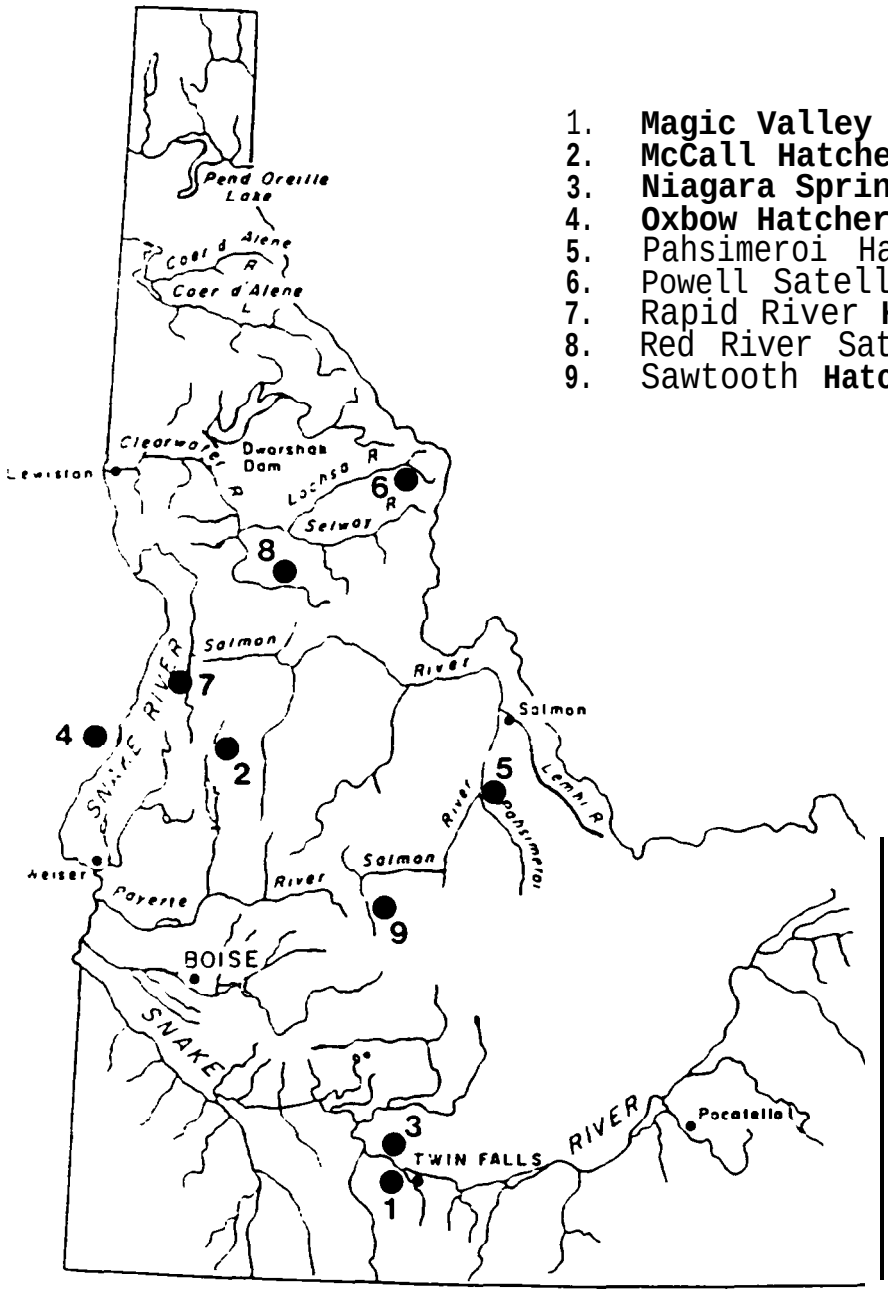
A total of 9 hatcheries or satellite facilities operated by the IDFG were evaluated. All are located in the Snake River Basin. Table 10 and Figure 1 show the approximate location for each facility. Summary Tables 1 through 13 detail information provided by IDFG in the data collection forms. These 9 facilities produced an average of 6,831,549 smolts weighing 566,101 pounds during this evaluation period.

Table 10. Approximate Location Of Hatcheries And Satellite Facilities Operated By The Idaho Department Of Fish And Game In The Snake River Basin.

Below Hells Canyon Dam On Snake River	Above Hells Canyon Dam On Snake River
1. Pahsimeroi Hatchery	1. Magic Valley Hatchery
2. Powell Satellite	2. McCall Hatchery
3. Rapid River Hatchery	3. Niagara Springs
4. Red River Satellite	4. Oxbow Hatchery
5. Sawtooth Hatchery	

Four hatcheries have been identified with approximately 359,500 pounds of expansion capability (Tables 11 and 12). Three of the four facilities are owned by Idaho Power Company (IPC) and any production changes or expansion would have to be negotiated. To obtain more detailed information refer to the individual hatchery discussions.

Figure 1. Approximate Location Of Hatcheries Operated By The Idaho Department Of Fish And Game Which Rear Anadrcmous Fish In The Columbia River Basin.



1. **Magic Valley Hatchery**
2. **McCall Hatchery**
3. **Niagara Springs Hatchery**
4. **Oxbow Hatchery**
5. Pahsimeroi Hatchery
6. Powell Satellite Facility
7. Rapid River **Hatchery**
8. Red River Satellite
9. Sawtooth **Hatchery**

Table 11. List Of Hatcheries And Satellite Facilities Operated By The Idaho Department Of Fish And Game Where Production Could Be Increased By Providing Additional Flow, Rearing Space, Or Flow And Rearing Space.

Flow	Rearing Space	Flow and Rearing Space
	1. Niagara Springs 2. Sawtooth	1. OxBow 2. Pahsimeroi

Table 12. Expansion Capabilities for Hatcheries Operated By The Idaho Department Of Fish And Game Which Rear Anadromous Fish In **The Columbia Basin.**

Hatchery	Addition Volume	Uater Temp.	Available at Site Range	Source	Del i very Method	Land Available	Potential Production Numbers	Pounds	Species
Niagara Springs	Existing Uater	58		Niagara Springs	Gravity	Yes	450,000	100,000	Summer Steelhead
oxbow	45,000 CPM	33-78		Uell/Snake Rive	Pump	Yes	3,000,000	50,000	Fall Chinook
2ahsimeroi	Large Volume	32-67		Pahsimeroi Rive	Pump/Grav.	Yes	3,000,000	187,500	Spring/Sun. Chinook
Sawtooth	Existing Uater	32-62		Salmon River	Gravity	Yes	550,000	22,000	Spring Chinook
						TOTAL	7,000,000	359,500	

Magic Valley Hatchery
Route 1
Filer, **Idaho 83328**

Funding Agency: USFWS

Species Reared: Summer Steelhead

Manager: Burton D. Ainsworth
Phone #: (208) 326-3230

Introduction

Magic Valley Hatchery is located 7 miles northwest of the town of Filer in the Snake River Canyon. Elevation of the facility is 3,000 feet above sea level. The hatchery was completed in 1987 by the U.S. Army Corp of Engineers (COE) and began operating at that time. It was constructed under the Lower Snake River Compensation Program (LSRCP) to rear summer steelhead for the Salmon River as mitigation for federal hydro-electric projects on the lower Snake River. The hatchery is located on the south shore of the Snake River while the Crystal Springs water supply is on the north side. The facility is staffed with 4.0 FTE's.

The rearing units are in good condition and consist of 32 raceways and 20 starting tanks. The facility also consists of the standard office, storage areas, feed room, etc.

No adults are collected at this facility. Eyed summer steelhead eggs are received in May and June from other hatcheries. They are incubated and fry are ponded in starter tanks inside the hatchery building and reared until approximately 2 inches in length. The fingerlings **are** then transferred to outside raceways and reared until release the following April. All smolts are released off station into various Salmon River tributaries.

This facility was not operating during the 3 year evaluation period. Steelhead releases in 1988 (first year of operation) and 1989 were 454,500 pounds and 509,100 pounds, respectively. No major disease problems were encountered the first 2 years of operation, but Infectious Pancreatic Necrosis Virus (IPN) was diagnosed the second year (caused very little loss).

The water right totals 56,315 gpm (125.47 cfs) from Crystal Springs. Crystal Springs is located on the north shore of the Snake River and is supplied by gravity flow to the hatchery on the south shore by a 42 inch diameter pipe. Average flow used is about 51,000 gpm and is a constant 58 to 59 degrees fahrenheit. High flows from Crystal Springs occur in October and low flows are in March and April when greatest poundage is on station and the most water is required for fish production. All raceways receive single pass water.

Current Production Constraints

The Crystal Springs water supply is lowest during March and April when maximum poundage is in raceways. Dissolved oxygen levels can drop to minimum levels after feeding during this period.

The entire water right is available only from October through December.

Raceways are considered to be at maximum production with available flow and densities.

Theoretical Production

Theoretical production based on the flow method is 462,215 and with density is 401,453 pounds. The flow method was calculated for low flow period in the spring when maximum pounds are on station. Theoretical calculations were computed for steelhead as follows:

Flow Method

1.19 X 1,445 gpm X 8.4" X 32 ponds = 462,215 lbs

Density Method *

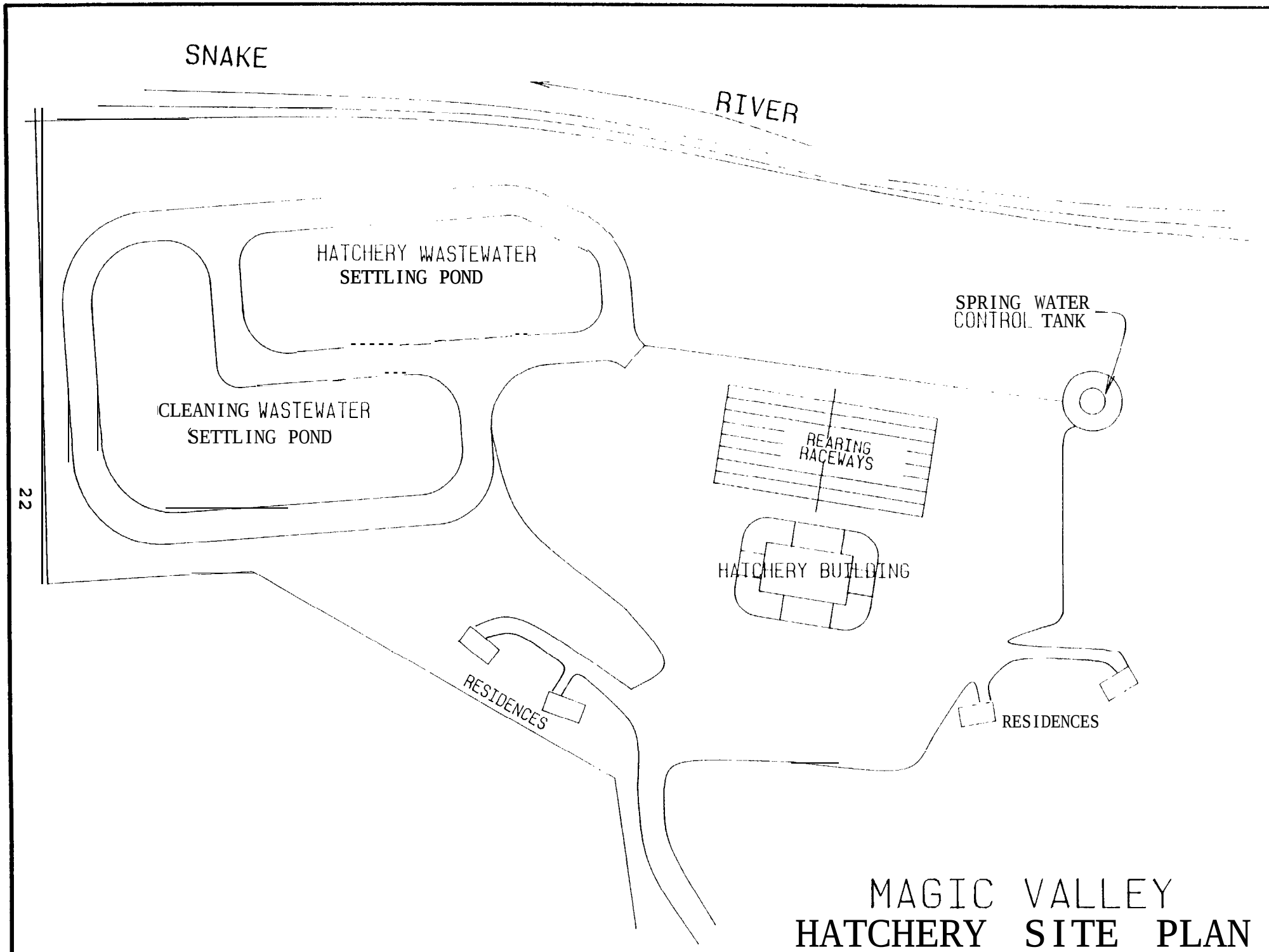
.25 X 5,974 cu ft X 8.4" X 32 ponds= 401,453 lbs

Comparison between the 2 theoretical calculations indicates that rearing space is probably the limiting factoring in production. Production the first 2 years hatchery operated averaged 481,800 pounds and the current agency goal is 445,000 pounds. The average pounds produced is higher than the theoretical flow calculation but no problems were encountered at this production level according to IDFG. The agency considers the higher production figure to be achievable but should be considered as maximum and may be on the edge when major problems could occur. As indicated above, during March and April the dissolved oxygen levels drop to minimum levels after feeding. Additional water could be utilized during this time.

Hatcher-v Exoansion Caoabilitv

The hatchery is situated on 25.46 acres owned by the USFWS. Approximately 100% of this area is being utilized. Additional property owned by the COE is located adjacent to existing raceways and is suitable for fish culture operations. Use of this area would have to be negotiated with COE and it is not known how receptive that agency would be. No additional water is available from Crystal Springs. The entire water right is not currently available during March and April when maximum pounds are on station. The potential for water from wells is not known.

No expansion capability is identified.



MAGIC VALLEY
HATCHERY SITE PLAN

McCall Hatchery
300 Mather Rd.
P.O. Box 1021
McCall, Id. 83638

Funding Agency: USFWS

Species Reared: Summer Chinook

Manager: Donald E. McPherson
Phone #: (208) 634-5109

Introduction

McCall Hatchery is located within the city limits of McCall, on the North Fork Payette River approximately .25 mile downstream from Payette Lake. Elevation of the facility is 4,980 feet above sea level. The hatchery was constructed and began operation in 1979 as part of the LSRCP to mitigate for federal hydro-electric projects. The facility is staffed with 5.25 FTE's.

The rearing units are in good condition and consist of 14 starter tanks and 2 large rearing ponds. The McCall satellite facility located on the South Fork Salmon River consists of 2 concrete adult holding ponds, a removable weir, fish ladder, and covered spawning area, all in good condition.

Adult summer chinook are trapped and spawned at the satellite facility located on the South Fork Salmon River near Warm Lake. Adults are collected from June through September and spawned. Eggs are transported to McCall, incubated, reared, and smolts released upstream of the satellite trapping facility to begin the cycle again. The cycle from egg to smolt release is approximately 18 months.

The main disease concern is Bacterial Kidney Disease (BKD). In brood years 1983, 1984, and 1985 the incidence of BKD was 25%, 13%, and 8.3% respectively. This corresponds to a drop out rate of 9.1%, 4% and 2% for each of those brood years.

The McCall Hatchery water right totals 8,977 gpm from Payette Lake through an agreement with the Lake Reservoir Company. This water amount is all that is available and can be supplied year round by gravity flow. Production and design criteria were established using this flow constraint. There are 2 intakes in the lake, one is at the surface and the other is 50 feet deep. This allows some control over water temperature throughout the year. All rearing units receive single pass water.

The South Fork Salmon River trapping facility has a water right of 8,977 gpm also. This facility is only used to trap adults. Water temperatures up to 70 degrees fahrenheit occur during August. Flows are not normally measured but are adjusted according to needs.

Current Production Constraints

All available water and space is being used.

Warm water and low flows at South Fork Salmon River trapping facility contribute to adult losses from fungus. The adult losses have contributed to low egg numbers in the past. Currently adults are being treated to control fungus and losses have been reduced.

Silt builds up in header pipe and incubator trays causing loss of eggs and fry. A silt chamber or trough is needed to settle out silt before water reaches eggs.

The main disease problem is BKD. The 2 large rearing ponds make isolation impossible after fish are transferred into them.

There is no good isolation chamber for other species coming in for resident fish projects. An annual resident high mountain lakes program occurs from May to October. The resident fish program utilizes the indoor starter vats and the redistribution section located at the lower end of the outside rearing ponds.

Theoretical Production

Theoretical production based on the flow method is 73,289 pounds and with density is 62,154 pounds. No theoretical production was calculated for the satellite facility since smolts are not reared at that location. Average production was 41,206 pounds and the 1987 agency goal was 50,000 pounds. Theoretical calculations were computed for summer chinook as follows:

Flow Method *
1.95 X 7,200 gpm X 5.22" = 73,289 lbs

Density Method
.25 X 23,814 cu ft X 5.22" X 2 ponds = 62,154 lbs

* Note: Flow used in calculation is 7,200 gpm or 16 cfs. This is the flow available to rearing ponds. Another 1,795 gpm or 4 cfs can be utilized inside the hatchery building but is not available for use in the rearing ponds.

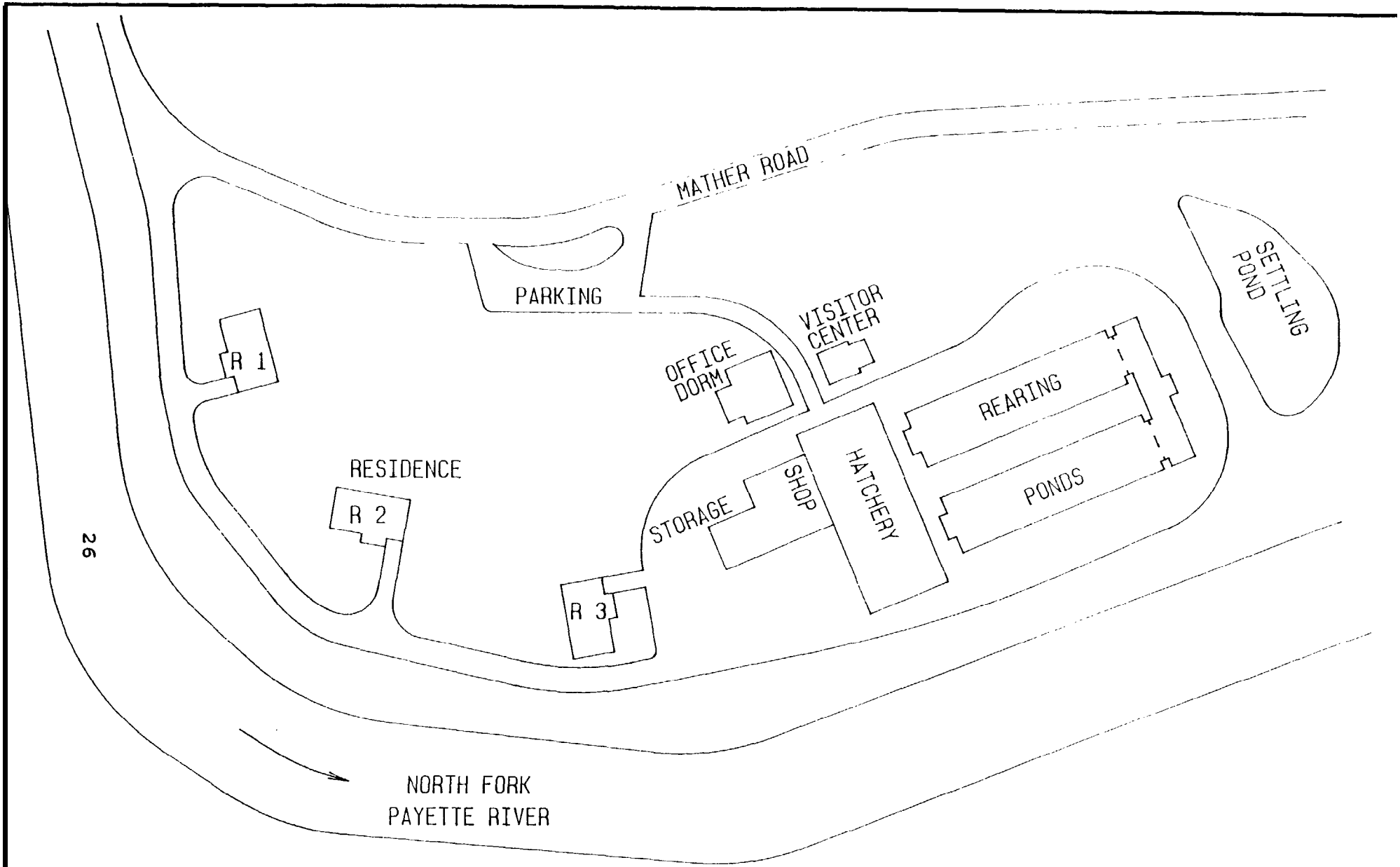
Comparison between the 2 theoretical calculations indicates that rearing space is probably the limiting factor in production. Both the average production and agency goal is less than the density calculation. This is slightly misleading as the rearing ponds are not raceways (with density index of .25) nor are they large inefficient ponds (which would use a density index of .03). If the

(.03) density index is used in calculation, theoretical density is only 7,458 pounds. In reality, a density index between the 2 listed above is probably correct for this facility.

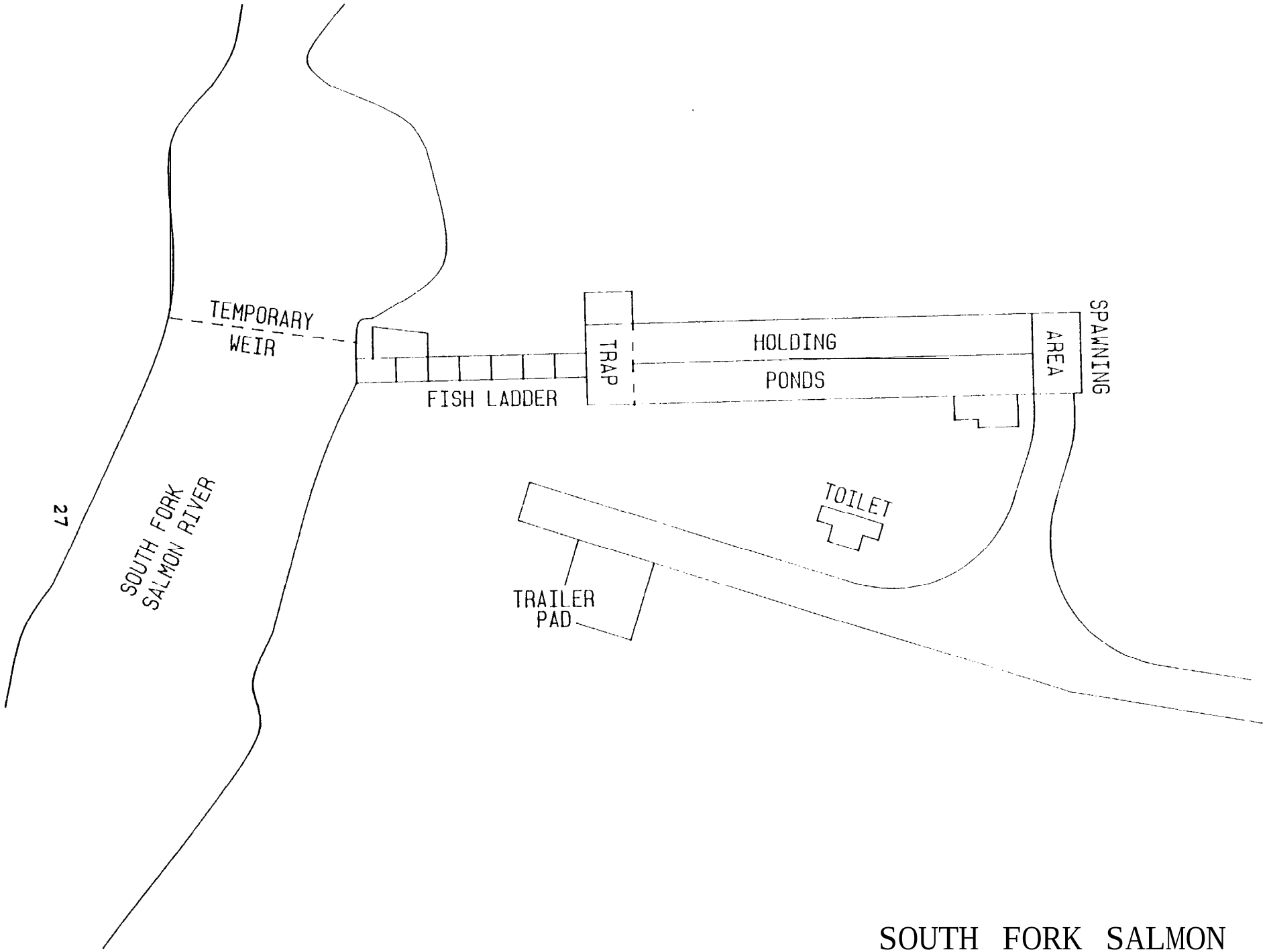
Hatchery Expansion Capability

The hatchery is situated on 15 acres owned by the USFWS. Approximately 100% of the area is being utilized. There is no additional land available adjacent to the facility. No additional surface water is available. The potential for water from wells is not known.

This facility has no expansion capability.



McCALL HATCHERY
SITE PLAN



SOUTH FORK SALMON
RIVER SATELLITE FACILITY

Niagara Springs Hatchery
2131 Niagara Springs Rd.
Wendell, Id. 83355

Manager: Jerry Mowery
Phone #: (208) 536-2283

Funding Agency: Idaho Power Co.

Species Reared: Summer Steelhead

Introduction

Niagara Springs Hatchery is located 10 miles south of the town of Wendell in the Snake River Canyon. Elevation of the facility is 3,000 feet above sea level. It is owned and financed by Idaho Power Company as required under the terms of their Federal Energy Regulatory Commission license for operation of Hells Canyon hydro-electric complex. The purpose of the hatchery is to relocate a portion of the Snake River run of steelhead into the Salmon River and also to preserve and enhance the steelhead run in the Snake River below Hells Canyon Dam. The hatchery began operation in 1966 and is staffed with 4.92 FTE's.

The rearing units are in fair to good condition and consist of 20 circular starter tanks and 14 raceways. Seven of these raceways are set up to accommodate 15 foot nursery inserts providing a total of 2,450 cubic feet of early fry rearing space. The inserts are removed after the fry stage and ponds are used as standard raceways.

No adults are collected or spawned at this facility. Eggs are transferred in from other hatcheries, incubated, reared, and released off station in the Salmon River or Snake River below Hells Canyon Dam. Smolts average about 4.5 fish per pound at release.

Disease plays a major role in the yield, number, and quality of smolts for release. Virus, Bacterial, and environmental health problems occur and have had extreme impact on the number and quality of fish raised. Viral diseases such as Infectious Pancreatic Necrosis) IPN and Infectious Hematopoietic Necrosis (IHN) have caused the most severe impact with losses as high as 15%. Bacterial diseases such as bacterial gill disease (BGD), furunculosis, enteric redmouth, and coldwater disease have caused up to 5% losses occurring in the past. Environmental conditions such as low dissolved oxygen (3.5 ppm at outflow) during periods of high densities: high ammonia, nitrite, and nitrate levels; and high solid, settleable, and suspended waste have also contributed to losses and reduced smolt quality.

The water right totals 59,246 gpm (132 cfs) from springs. Flow and temperature are constant year round. Total flow from the springs is about twice the water right. The water right for the additional water is held by another user. A 20 ton water chiller is used to cool spring water during the spring time when fish are being transported and liberated. Chilling the water acclimates smolts to

temperatures they will encounter after release. All rearing facilities are supplied with single pass water.

Current Production Constraints

The major constraint is limited rearing space. There is currently 103,600 cubic feet of rearing space. Rearing densities are too high for production of quality smolts. This is evident in the discussion above on disease and environmental problems. Those problems are at least in large part due to over crowding to meet the production goal of 400,000 pounds. Using the .25 density index, indicates that a minimum of 188,235 cubic feet of rearing space is required to meet the production goal.

The current water right is available year round and could support the additional production facilities required to produce high quality smolts.

The pollution abatement settling pond is insufficient to handle the existing waste production and water flow. Only 50% of the flow from one raceway can be diverted through the 12 inch pipe which feeds the pond.

Water outflow is of poor quality with heavy loads of settleable solids and low dissolved oxygen levels. The outflow meets effluent requirements the majority of the year. In recent years effluent has exceeded permitted levels an average 2 months per year.

Incubation and early rearing volume are insufficient for current production goal. Inserts in 7 raceways are used to make up this shortfall. The circular vats can only hold fry until button up and then they must be moved outside. This causes problems for feed training, density, handling, and diseases.
The water supply is open to contamination from resident fish, spill from commercial hatchery transport trucks, sportsmen cleaning fish, and ground water contaminants from various agricultural sources.

The delivery system to incubation facility and initial rearing is old, inefficient, and could fail for many reasons. Delivery system to raceways is via a head box that would be difficult to expand.

Water quality is good but over many years has changed somewhat for the worse with ground water contaminants from agricultural use above the Snake River Canyon.

Production goals are set by Federal Energy Regulatory Commission (FERC) license to IPC. Any change or addition in production would need to be negotiated.

Theoretical Production

Theoretical production based on the flow method is 629,606 pounds and with density is 223,125 pounds. Average production was 354,150

pounds and the 1987 agency goal was 400,000 pounds. The current production goal is 1,800,000 steelhead smolts weighting 400,000 pounds. Theoretical calculations were computed for steelhead as follows:

Flow Method

1.25 X 59,257 gpm X 8.5" = 629,606 lbs

Density Method

.25 X 105,000 cu ft X 8.5" = 223,125 lbs

Comparison between the 2 theoretical calculations indicates that pond space is limiting factor in production. Water supply will support additional rearing facilities. Average production and the agency goal are both greater than the theoretical density figure. The disease and environmental problems described above are an indication that densities are too high. Production capacity should be closer to the density calculation to produce high quality smolts.

Hatchery Expansion Capability

The hatchery is situated on 45.3 acres owned by Idaho Power Company. Approximately 100% of the area is being utilized. Approximately 3 to 4 acres is available for expansion on the far side of Niagara Springs. The existing water right will support additional rearing facilities and increased production. Additional water rights from existing spring supply are held by Rim View and probably are not for sale. The potential for water from wells is not known.

The existing water supply could produce a total of 500,000 to 600,000 pounds given additional rearing facilities. This is 100,000 to 200,000 pounds more than the current production goal. To obtain this production would require a minimum of 14 additional raceways each 300" X 10' X 4'. Seven of those raceways would be used to reduce overcrowding in existing facilities and 7 would be used to increase production.

Expansion would require construction of raceways described above, additional starter ponds, new headbox, water delivery system, and pollution abatement settling pond. Expansion capability identified in this report is assumed to be 450,000 steelhead smolts weighing 100,000 pounds, but potentially could be twice this number.

Oxbow Hatchery
P.O. Box 200
Oxbow, Or. 97840

Funding Agency: Idaho Power Co.

Species Reared: Summer Steelhead

Manager: Cary F. Bertelletti
Phone #: (503) 785-3459

Introduction

Oxbow Hatchery is located in Oregon near Oxbow hydro-electric facility on the Snake River. Elevation of the facility is 1,689 feet above sea level. The hatchery is utilized mainly for trapping sufficient numbers of returning adult summer steelhead and spring chinook to fulfill IPC's anadromous fish mitigation requirements. Summer steelhead eggs are also incubated to the eyed stage and then transferred to other hatcheries. Smolts are not normally reared but steelhead fry plants were made each year of this evaluation. The facility began operating in 1961 and is staffed with 1.58 FTE's.

The hatchery facilities are in poor to good condition and consist of 6 raceways, 4 adult holding ponds, 7 starter vats, and 14 double incubator stacks. The adult holding ponds are being used to hold adults. Five of the 6 raceways are currently unusable and only 4 of the starter vats are plumbed for use. Raceways are in need of major repair or replacement. The incubators are a mix of old and new.

Both summer steelhead and spring chinook adults are trapped at the Hells Canyon Dam ladder. Steelhead are trapped, held over winter, spawned in the spring, eggs are incubated to the eyed stage, and then transported to Niagara Springs Hatchery. If excess eggs are available they are hatched and released as fry. Trapped adult spring chinook are held temporarily until transfer to Rapid River Hatchery for spawning.

There is no water right for fish propagation. Water used at Oxbow Hatchery for aquaculture purposes is part of the overall water license IPC holds for operation of the Oxbow hydro-electric facility. The Hells Canyon trap has a water right of 132 cfs to operate the fishway and trap.

Water is supplied to the 4 adult holding ponds from the Hells Canyon pool directly below Oxbow Dam by two 100 horsepower pumps. These pumps supply different amounts of water with one providing 6,115 gpm and the other 2,315 gpm according to tests done in 1987. The pumps were designed to deliver approximately 7,181 gpm each. Raceways can also be supplied with these pumps. The incubation room is supplied from the same source with two 5 horsepower pumps. They are located below a hydro-electric plant and water quality, amount, and temperature vary daily. All pumps are older models and have lost some efficiency. The water supply delivered to ponds

tends to fluctuate as the reservoir level rises and lowers. The small pumps are designed for 150 gpm but can only supply 110 gpm. All facilities receive single pass water.

Current Production Constraints

Five of the six raceways are currently unusable. They need major repair or replacement.

Water quantity is not a problem but quality is. The current water supply has many problems including: high silt load during incubation periods, nitrogen supersaturation, low dissolved oxygen levels, high water temperatures during summer (76 degrees fahrenheit), low water temperatures (33 degrees fahrenheit) during winter, and is a source of disease pathogens.

Crappie, carp, catfish, and bass are all pumped from the Snake River into holding ponds and incubation systems. Pump intakes need to be adequately screened to prevent this from occurring. A well water supply is needed for adult holding, spawning operations, egg incubation, and rearing.

There is no water alarm system from pumps to head box. The current degassing system is inefficient. Power supply to pumps is unreliable.

Egg incubation occurs during rising water temperatures, increased sediment loading, and high run-off and spill from Oxbow Dam which causes gas problems. There is no method to degas or filter the water supply.

Egg incubators are a mixture of old and new trays used to make up stacks. Plumbing for the incubation system consists of an old tank and pipe which is corroded and full of rust. The incubation system is not accessible for disinfection.

Adult handling is difficult and inefficient. Holding ponds are 8 feet deep with top surface at ground level. Fish must *be* transferred via a large electric crowder into a center isle that has no work area before they can be handled. This area is too small and inefficient to handle large numbers of adults. Adults must be netted and lifted out for spawning or when transferred to other holding ponds. Adults to be transported to Rapid River Hatchery must be put into a hopper and raised into trucks.

Ladder and trapping facility is located 23 miles downstream from hatchery and adults must be trucked.

The population of Snake River fall chinook is currently inadequate to supply eggs for rearing large numbers of smelts.

The land and facility are owned by IPC and any changes and/or increases in production would need to be negotiated.

Theoretical Production

Theoretical production based on the flow method is 7,200 pounds and with density is 10,125 pounds. Average production was 34 pounds (fry plants) and there is no agency goal. This facility is used mainly for adult capture, holding, and spawning in addition to incubating steelhead eggs. Theoretical calculations were computed for spring chinook as follows:

Flow Method *
1.2 X 200 gpm X 5" X 6 raceways = 7,200 lbs

Density Method *
.25 X 1,350 cu ft X 5" X 6 raceways = 10,125 lbs

* Note: Theoretical calculations assume all 6 raceways are being used. As indicated above, 5 of the 6 are currently unusable. Adult holding ponds are not used to rear fish so were not used in calculations.

Comparison between the 2 theoretical calculations indicates that flow would probably be the limiting factor in production. With the current water supply it is not feasible to rear yearling smolts. An adequate supply of well water may be required before smolts could be produced at this facility. Raceways would also need to be rehabilitated.

Hatchery Exoansion Capability

The hatchery is situated on about 4 acres owned bv IPC. The facility is-part of the overall hydro-electric project area. Approximately 25% of the area is currently taken up by buildings, ponds, etc. There is room for expansion at the old natural spawning channel. Additional surface water from the Snake River is available in large quantities but is subject to limitations described above. The potential for well water is not known. Well water is required before production could be expanded.

Production could be expanded to produce 3,000,OOO fall chinook smolts weighing 50,000 pounds. This would require the following:

1. Rehabilitate and/or add additional pumps and plumbing to supply more reservoir water to hatchery. Water supply must be adequately screened, degassing facilities installed, and facilities included for settling out or filtering sediment.

2. Develop ground water supplies (wells).

3. Replace existing raceways. It would require approximately

41,500 cubic feet of rearing space. This could be provided with fourteen 10' X 100' X 3' raceways or seven 20' X 100' x 3' raceways.

4. An adequate supply of Snake River stock fall chinook eggs.

A minimum of 100 gpm of well water is required for incubation. If production was expanded to 50,000 pounds then upwards of 7,000 gpm would be required. Some of the well water could be utilized for holding adults also.

Pahsimeroi Hatchery
Box 85
Ellis, Idaho 83235

Manager: Bob Moore
Phone #: (208) 876-4475

Funding Agency: IPC

Species Reared: Spring Chinook
Summer Chinook

Introduction

Pahsimeroi Hatchery is located just upstream from the confluence of the Pahsimeroi and Salmon Rivers. The hatchery is divided into 2 locations with the lower facility 1 mile upstream and upper facility 7 miles upstream from the confluence of the 2 rivers. Elevation of the lower facility is 4,669 feet and the upper site is 4,760 feet above sea level. The hatchery began operation in 1969. It is owned by IPC and is operated as a mitigation facility for lost habitat from dams constructed in the Snake River. The hatchery is staffed with 3.33 FTE's.

The lower site contains an adult trap, spawning area, egg incubation, and early rearing facilities. The upper area contains 2 earthen ponds for smolt rearing. The incubation facilities can handle 1.9 million eggs to button up fry stage. All facilities are in good condition.

Adult steelhead are trapped from February to late April. They are spawned and eyed eggs shipped to Niagara Springs Hatchery. Chinook are trapped from June through early October and eggs taken for smolt production. Eggs are also transferred in from other facilities. Chinook eggs are incubated and fry started at the lower facility during the spring. Fingerling chinook are then transferred to the upper rearing ponds and reared until released the following March. Spring chinook were released on site and into the Snake River while summer chinook were all released on site.

During this evaluation both spring and summer chinook were reared. The current agency goal is to produce only summer chinook.

The main disease problems encountered are BGD, BKD, and whirling disease. Both BKD and BGD are kept under control through treatment and management practices. Whirling disease has recently been found in the watershed and early rearing may have to be done with spring water to remove contact with the organism and prevent mortality.

The water rights at the lower facility total 36,130 gpm (80 cfs) from the Pahsimeroi River (2 water rights) and a spring. All but 224 gpm is from the Pahsimeroi River. The 2 Pahsimeroi River water rights are held for different months (March through November and December through February) so only 17,953 gpm (40 cfs) can be used at any one time. Water is supplied by both gravity flow and pumping from the river and is pumped from the spring. Most of this water is utilized to operate the trap and start fry. No smolts

are reared at the lower facility. Spring water is used to incubate steelhead and salmon eggs to the eyed stage. The water right for the spring utilizes only half the water available.

Water rights at the upper facility total 8,976 gpm from the Pahsimeroi River. Actual water usage varies from 4,488 gpm to 7,181 gpm depending on time of year and fish density. Water is not limiting as the Pahsimeroi River could supply more flow year round than the water right. This water is supplied by gravity flow and each pond receives single pass.

Current Production Constraints

Available rearing space is limiting production. There is ample room and water for additional rearing ponds/production.

The adult trap is set up in one of the adult ponds and can not be used for holding. The current adult trapping configuration allows holding only up to 1,000 adults. If trapping could be done before fish reach holding pens an additional 500 adults could be held.

Current incubation capacity is limited to 1.9 million button up fry. Additional incubation capacity would be needed if production was expanded. Additional spring water is available.

Early rearing starter raceways (4 of them) are capable of rearing 1.3 million fingerlings to ponding size. Additional capacity would be needed to expand production.

The facility is owned by IPC and any changes would have to be negotiated.

Theoretical Production

Theoretical production based on the flow method is 79,476 pounds and with density is 17,007 pounds. Average production was 27,349 pounds and the 1987 agency goal was 63,700 pounds. Theoretical calculations were computed for summer chinook as follows:

Flow Method *

1.5 X 8,950 gpm X 5.92" = 79,476 lbs

Density Method

.03 X 95,760 cu ft X 5.92" = 17,007 lbs

* Note: Flow used in theoretical calculation is the total water right which is available year round for use in the two rearing ponds. The actual water use in rearing ponds is about 7,181 gpm and provides a theoretical production of 63,767 pounds.

Comparison between the 2 theoretical calculations indicates that rearing space is probably the limiting factor in production. The current agency goal is 62,500 pounds. This poundage has been produced without any problems and calculates out to a density index of .ll. This facility appears to be able to produce fish at a rate somewhere between a raceway and large pond. The current goal is probably a realistic capacity based on the agencies past rearing experience at this site.

Hatchery Expansion Capability

The lower facility is situated on 16.46 acres and the upper on 9.9 acres, both owned by IPC. There is ample room on hatchery grounds for expansion. The hatchery is surrounded by private land suitable for fish culture but would need to be purchased. The existing water right could support increased production. Additional water from the Pahsimeroi River is available in large quantities. Approximately 224 gpm of additional spring water is also available. The potential for water from wells is not known.

With modest improvements and construction, spring or summer chinook production could be increased by 750,000 smolts weighing 46,875 pounds. The existing adult holding and incubation facilities would be at capacity with this additional production. It would require the following:

1. Construct 4 additional starter raceways each 4' X 100' X 2.1".

2. Enlarge and line existing rearing ponds. Existing settling ponds would also have to be replaced.

3. Install additional pumping and storage tank. Existing flow and water rights are sufficient.

With a major construction effort it would be possible to rear a total of 4 million smolts weighing 250,000 pounds. This is 3 million (weighing 187,500 pounds) more than current production. It would require:

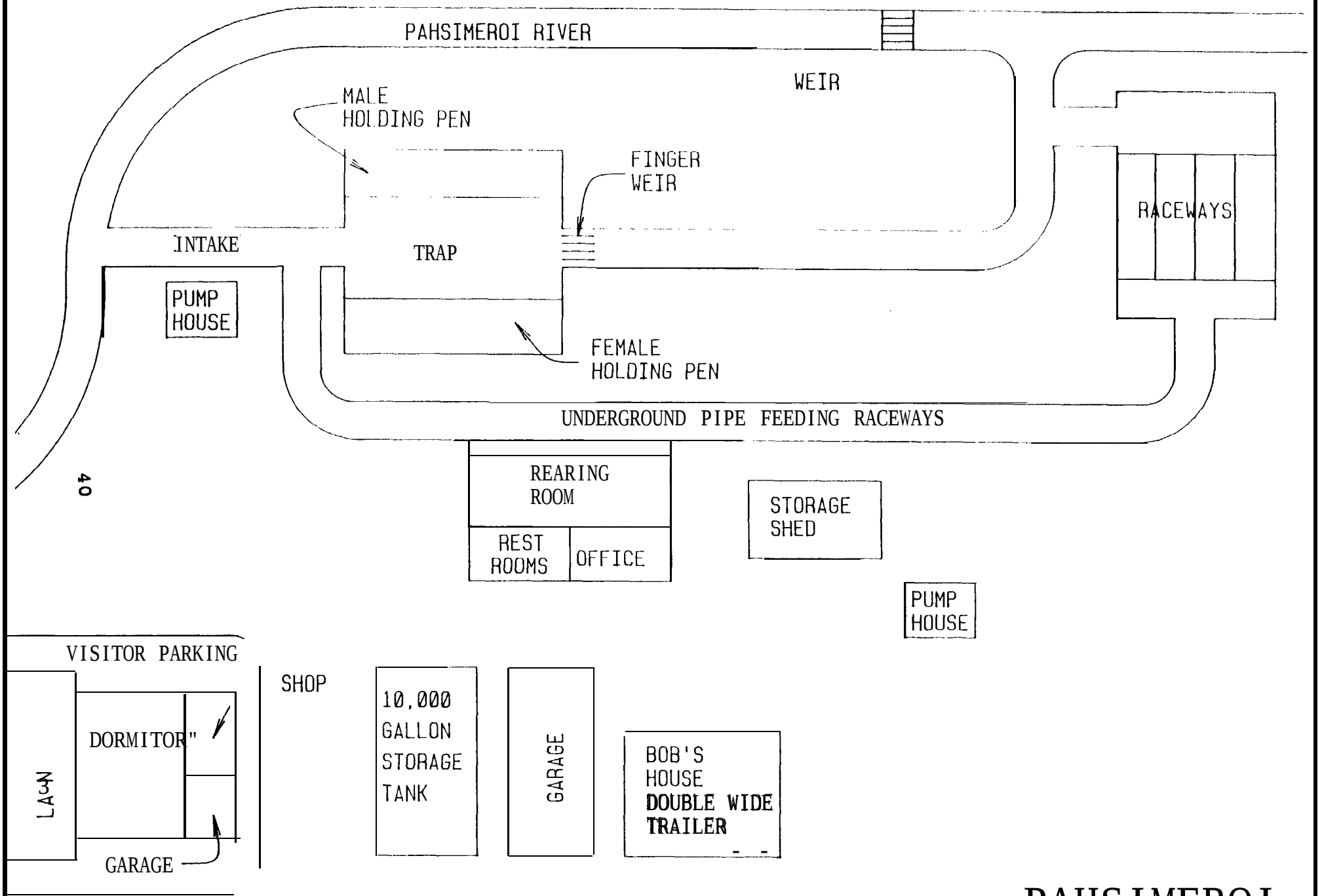
1. Enlarge adult holding facility.

2. Enlarge incubation capacity by 60 stacks of 16 trays each.

3. Add 12 additional starter ponds each 4' X 100' X 2.1'.

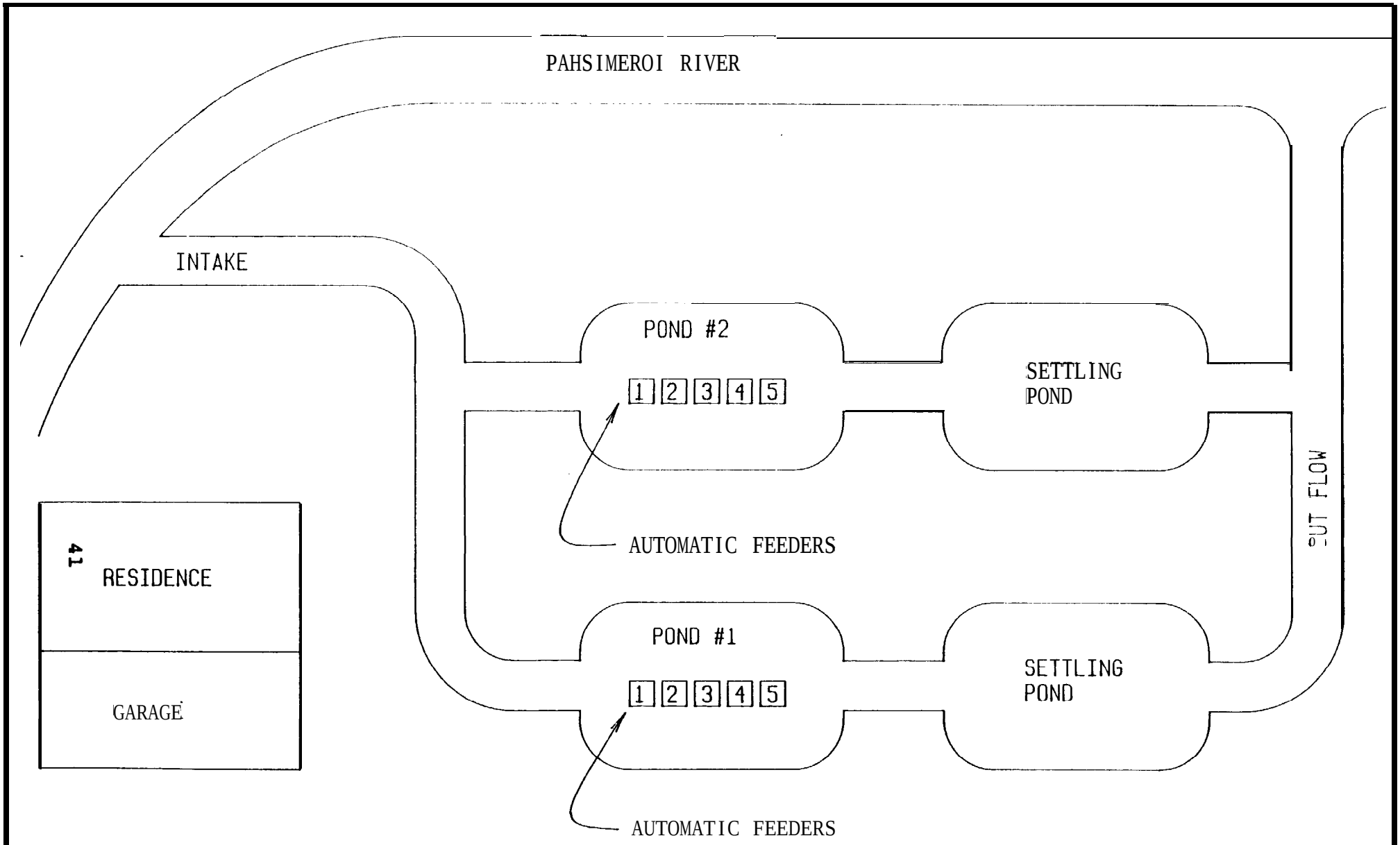
4. Add 3 additional rearing ponds each 50' X 300' X 3.5'. An additional 6,732 gpm (15 cfs) of water would be required if the ponds were set up for serial re-use. Additional flow would be required if ponds were designed with a single pass water system.

5. Add pumps, plumbing, and distribution system as required.



LOWER SITE

PAHSIMEROI HATCHER!'



UPPER SITE

PAHSIMEROI HATCHERY

Powell Satellite Facility
Powell Ranger Station
Lolo MT 59847

Funding Agency: USFWS

Species Reared: Spring Chinook

Manager: Jerry McGehee
Phone #: (208) 942-3270

Introduction

Powell Satellite is located on the upper Lochsa River (Clearwater system). Elevation of the facility is 4,600 feet above sea level. It began operating in 1989 so had no releases during the period evaluated in this report. This facility is to be operated as a satellite to the Clearwater Hatchery after it is constructed in 1992. Powell satellite will rear spring chinook and is approximately 135 miles from the main hatchery and administration office. The facility is staffed with 1.6 FTE's.

This facility is in excellent condition and consists of 2 adult holding ponds and a graveled rearing pond. A floating weir is placed across the Lochsa River to divert spring chinook adults into Walton Creek where they enter the ladder and trap. Adults are trapped beginning in July and continues until the middle of September. They are spawned on site and eggs transported to Kooskia NFH for incubation and early rearing. After the Clearwater Hatchery is constructed and begins operation in 1992, eggs will then be transferred there instead of Kooskia NFH. The operational plan calls for fingerlings to be transferred back the following June at 100 fish per pound. Fingerlings are to be reared until the end of October and released into Walton Creek at about 25 fish per pound.

The water right totals 4;937 gpm (11 cfs) from two sources, Walton Creek (3,142 gpm) and Lochsa River (1,795 gpm) . The Walton Creek water right allows water use from June 1 through October 30 of each year. The Lochsa River water right allows water use from July 1 through September 30 of each year and is only used when Walton Creek flows do not provide enough water to operate the entire facility. Walton Creek water is supplied by gravity flow while Lochsa River water must be pumped. Water is re-used from the rearing pond to adult holding ponds.

Current Production Constraints

This facility is located 135 miles from the main hatchery and administration complex.

The remote location and cold winter weather prevent this facility from operating year round.

This site was designed as an adult collection and juvenile

acclimation facility.

Theoretical Production

Theoretical production based on the flow method is 17,258 pounds and with density is 7,956 pounds, No production occurred during evaluation period but approximately 17,470 pounds were produced in 1989. The current agency goal is 12,800 pounds of spring chinook Theoretical calculations were computed for spring chinook as follows:

Flow Method
1.88 X 1,800 gpm X 5.1" = 17,258 lbs

Density Method
.03 X 52,000 cu ft X 5.1" = 7,956 lbs

Comparison of the 2 theoretical calculations indicates that rearing space may be the limiting factor in production. The 1989 production figure is nearly equal to the theoretical flow calculation and provides a density index of .066, which is intermediate between the raceway and large rearing pond Indices. A density index of about .05 is required to meet the current agency production goal. This is a new facility and the actual capabilities are not known.

Hatchery Expansion Capabilitv

The hatchery is situated on 7.77 acres owned,by the USFS. Approximately 100% of the area is being utilized. The area adjacent to the facility is not suitable for hatchery facilities, There is no additional gravity flow water available, but additional water could be pumped from the Lochsa River, The potential for water from wells is not known.

The remote location and harsh winter weather make this facility an unlikely candidate for year round operation or expansion.

No expansion capability was identified.

Rapid River Hatchery
H.C. 69 Box 85
Riggins, Id. 83549-9702

Funding Agency: IPC

Species Reared: Spring Chinook

Manager: Tom Levendofske
Phone #: (208) 628-3277

Introduction

Rapid River Hatchery is located along Rapid River in the lower Salmon River Basin near the town of Riggins. Elevation of the facility is 2,185 feet above sea level. The hatchery was constructed and began operation in 1964. It is operated as a mitigation facility for hydro-electric dams constructed on the Snake River by IPC. The hatchery is staffed with 5.92 FTE's.

The rearing units are in poor to good condition and consist of 12 raceways (11 are usable), 5 rearing ponds, and 3 adult holding ponds. Adult spring chinook returning to the hatchery are captured and spawned. Adults are also transferred in from Oxbow Hatchery on the Snake River. Any summer chinook or steelhead captured are released in Rapid River above the hatchery intake system. Smolts are reared to yearling size and released early in the spring. The majority are released into Rapid River on site and the remaining into the Snake River at Hells Canyon.

Diseases include Erythrocytic Inclusion Body Syndrome (EIBS), BGD, and minor levels of BKD. EIBS outbreaks begin in late September in pond 2 system and have usually ended by late October. Pond 1 usually has EIBS beginning in December and is a chronic problem until release.

Water rights total 21,027 gpm from Rapid River. This water right is divided into 12,567 gpm for rearing ponds, 8,348 gpm to operate the adult fish trap, and 112 gpm for domestic use. The entire water right is used and during most of the year accounts for the entire flow in Rapid River. The incubation system uses river water pumped from raceway headbox with a backup gravity flow system using a filter bed in Rapid River. Rearing ponds are used June through March and normally not used in April and May.

Water from raceways is re-used in rearing pond 1 and then is re-used again in adult holding pond 2. This water is used a total of 3 times. Rearing pond 2 is supplied with single pass water and is re-used in adult holding ponds.

Current Production Constraints

Flow is a limiting factor in production and affects fish quality especially during the second half of rearing cycle. Additional flow would help flush disease organisms and fish waste out of ponds

more efficiently.

Water quality is poor when large amounts of rain occurs in the Rapid River drainage. Ash in water can have a detrimental effect on eggs. The water delivery system is prone to clogging with pine needles and leaves.

Rearing pond 1 has a poor turnover rate which makes any disease outbreak a serious problem. The pond receives re-use water from raceways and experiences BGD each summer. This rearing pond was modified in 1990 with concrete walls added which should improve flow patterns and reduce disease problems.

The design of the adult holding facilities (dirt ponds) requires excess handling of fish and can cause fish losses. During years of egg shortages this can be a serious problem. Fish have to be seined 4 times a week. Cement ponds with crowder racks would eliminate a lot of stress on men and fish. Cement bottoms would also keep fish from spawning in ponds, lower mortality, and increase egg take numbers considerably.

Cold water temperatures during incubation sometimes delay egg development which results in delayed hatching and smaller smolts released. In some years spring chinook smolts are smaller than 20 per pound.

This facility is owned and funded by IPC and any changes in production would need to be negotiated.

Theoretical Production

Theoretical production based on the flow method is 153,037 pounds and with density is 24,393 pounds. Average production was 103,800 pounds and the 1987 agency goal is 150,000 pounds. The production goal is set by contract with IPC. Theoretical calculations were computed for spring chinook as follows:

Flow Method

2.44 X 12,544 gpm X 5" = 153,037 lbs

Density Method

.03 X 162,621 cu ft X 5"= 24,393 lbs

Note: Raceways and adult holding ponds were not used in density formula since smolts are not reared and released from them.

Comparison between the 2 theoretical calculations indicates that rearing space may be the limiting factor in production. For

production to equal the agency goal, a density index of .2 or nearly the index for raceway rearing conditions is required. The IDFG considers this to be a realistic index for these rearing ponds.

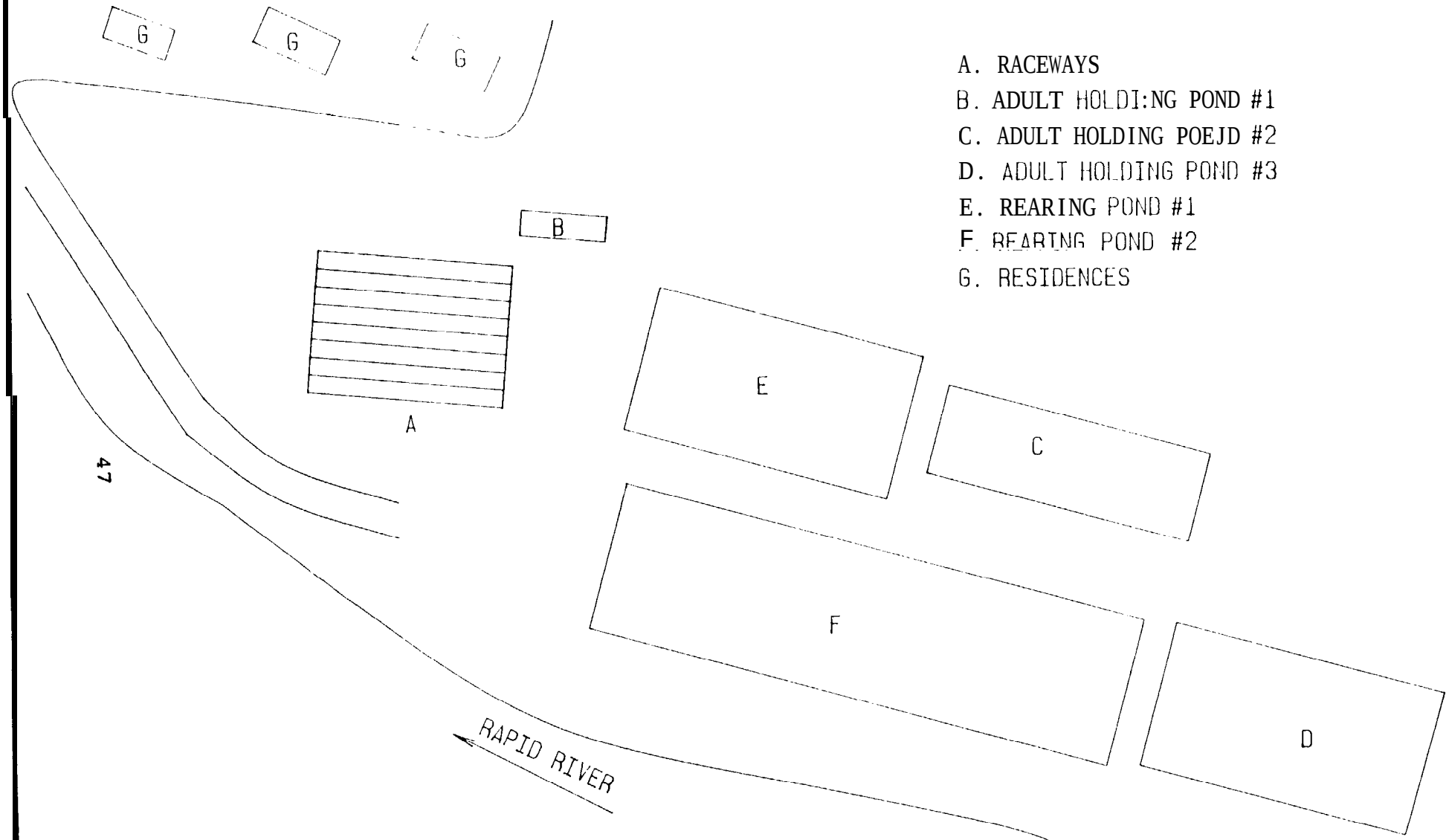
Hatchery Expansion Capability

The hatchery is situated on 35.3 acres owned by IPC. Approximately 100% of the site is being utilized. There is not any suitable land adjacent to the facility for expansion. All available river water is already being utilized. The potential for water from wells is unknown.

The intake to pond 1 was modified in May 1990 so cover the entire pond width and should improve rearing conditions. To further improve smolt quality and alleviate periodic egg shortages the following are needed:

1. Adult holding ponds should be reconstructed with concrete.
2. A settling pond constructed between intake and hatchery to settle out silt and debris.
3. Raceways should be plumbed separately from pond 1.
4. Pollution abatement pond should be constructed.

No expansion capability is identified.



RAPID RIVER HATCHERY
EXISTING FACILITIES

Red River Satellite
HC R Box 23-U
Elk City Idaho 83525

Funding Agency: USFWS

Species Reared: Spring Chinook

Manager: Jerry McGehee
Phone #: (208) 935-2112

Introduction

Red River Satellite is located along Red River, a tributary of the Selway River (Clearwater Basin) near the town of Elk City. Elevation of the facility is 4,200 feet above sea level. Since 1987 this facility has been operating as part of the LSRCP, but originally began operation in 1977 with funding by NMFS under the CRFDP. The current goal is to trap 500 adult spring chinook and rear 300,000 pre-smolts for release in the fall. Once the Clearwater Hatchery is complete in 1992 this facility will be operated as a satellite to it. The facility is staffed with 2.7 FTE's.

The facility consists of 2 adult holding ponas and 1 large dirt rearing pond. Adult trapping begins in June and continues until September. Spawning starts in early August and continues to about September 10. Eggs are transferred to Kooskia NFH or Rapid River Hatchery. After eggs are eyed up they are transferred to Dworshak NFH to complete incubation and for early rearing. Juvenile fish are reared at Dworshak until they obtain a size of about 100 fish per pound and are then transferred back to Red River Satellite in June. Fingerlings are reared throughout the summer and released into Red River at the end of October as pre-smolts at about 25 fish per pound. Once the Clearwater Hatchery is complete eggs will be incubated and early rearing will occur there.

Water rights total 4,488 gpm (10 cfs) from the South Fork Red River, but only about half this amount can be used at any one time without drying up the river below the intake structure. Average water use is 1,795 gpm. All ponds receive single pass water.

Current Production Constraints

Available water limits production. The rearing pond is a 2.5 acre dirt pond and the turnover rate with the existing water supply is 25 hours. This is very impractical for treating diseases. Rearing pond would have to be much smaller to bring space into balance with available water.

Four parasites have been found on fish reared here; ich, hexamita, costia, and epistylis. The combination of these parasites caused a major fish kill in 1989.

High summer water temperature is a problem for holding adults.

Water temperature reaches 69 degrees fahrenheit for short periods and can average 65 degrees for longer times. A source of cooler holding water would improve adult survival and increase egg takes.

Spawning area is very small. Only room to hold 500 adults. There are no incubation facilities.

This facility is 120 miles from the main hatchery complex.

The remote location and harsh winter weather restrict year round operation at this site.

Theoretical Production

Theoretical production based on the flow method is 6,947 pounds and with density is 67,830 pounds. The average production was 5,248 pounds and the 1987 agency goal was 12,000 pounds. Theoretical calculations were computed for spring chinook as follows:

Flow Method

1.3 X 1,125 gpm X 4.75"' = 6,947 lbs

Density Method

.03 X 476,000 cu ft X 4.75"= 67,830 lbs

Comparison between the 2 theoretical calculations indicates that flow is limiting factor in production. The rearing pond is far to large for existing water supply. The large rearing volume may allow production above the flow calculation in some years but problems can be expected to occur in the future. The large dirt pond and slow water turnover rate provide a good environment for the parasites listed above. Periodic fish losses such as occurred in 1989 can be expected until the pond is reduced in size and modified to improve flow patterns. The IDFG plans to complete modification of the pond in 1990.

Hatchery Expansion capability

This facility is situated on 6.29 acres owned by the USFS. Approximately 100% of the site is being utilized. All available water from the Red River is being used. The potential for well water is unknown.

Well water is needed to supply a source of cool water for holding adults throughout the summer. This would improve adult survival and should increase the number of eggs taken. Well water could probably also be utilized in the rearing pond.

No expansion capability is identified.

Sawtooth Hatchery
HC 64 Box 9905
Stanley, Idaho 83278

Funding Agency: USFWS

Species Reared: Spring Chinook

Manager: Richard D. Alsaler
Phone #: (208) 774-3684

Introduction

Sawtooth Hatchery is located in the upper Salmon River near the town of Stanley. Elevation of the facility is 6,480 feet above sea level. The hatchery was constructed and began operation in 1985 as part of the LSRCP. Mitigation goals are to rear 2.4 million spring chinook smolts and incubate 4.5 million summer steelhead eggs for hatcheries in the Hagerman Valley. A satellite station is located on the East Fork Salmon River to trap, collect, and spawn adult chinook and steelhead. This facility, including the East Fork trap is staffed with 11.41 FTE's.

The rearing facilities consist of 100 incubator stacks, 16 inside starter tanks, 6 fry raceways, 14 raceways, and 3 adult holding ponds. No juvenile rearing occurs at the East Fork trap.

Steelhead are trapped and spawned during March and April at both Sawtooth and East Fork facilities. Eggs are incubated until eyed up and then transferred to Hagerman Valley hatcheries. Steelhead adults are checked for whirling disease and IHN during spawning and eggs from IHN positive adults are not shipped to the Hagerman Valley hatcheries. Any eggs taken which exceed numbers required to meet smolt production goals are reared to fry stage and out planted into various Salmon River tributaries. Smolts from the Hagerman Valley hatcheries are released at Sawtooth Hatchery and the East Fork Trap to maintain the runs.

Spring Chinook are trapped from June until the end of August at both facilities. Fish are spawned mainly in August but can run into early September. All eggs are incubated and hatched at Sawtooth Hatchery. Juveniles are reared for about 16 months and smolts reieased at both facilities at 20 to 25 fish per pound. Smolts resulting from eggs taken at East Fork facility are released back at that site. Excess fry above production goals are out planted in the upper SalmonRiver drainage.

Disease problems are relatively minor except for BKD in spring chinook. Prophylactic measures are used throughout the spawning and rearing cycle to control it. Adults are injected with erythromycin and juveniles are fed with medicated feed twice a year before stressful handling periods to reduce fish losses. Whirling Disease has also been found in some spring chinook.

Water rights for the hatchery total 19,883 gpm from the Salmon River (15,709 gpm), 3 wells (4,039 gpm) used for fish culture, and

1 well (135 gpm) used for domestic purposes. Salmon River flows do not limit available water at any time during the year. Salmon River water is used in production raceways and for incubation and early rearing if temperatures are at desired levels. The wells can supply 3,500 gpm and are used for incubation, early rearing, and to temper river water during the winter. Water from production raceways flows into a settling pond and is re-used in adult holding ponds during the trapping season. All other facilities receive single pass water.

The water right held at the East Fork Salmon River Trap totals 6,732 gpm (15 cfs) from the East Fork Salmon River. This water is used to operate the East Fork satellite adult trapping facility. Available water is not limiting at this facility. The adult trap is operated from March through September and no juvenile rearing occurs.

Current Production Constraints

The present design of the Sawtooth Hatchery river intake and diversion sill allows ice to enter intake during winter. Potentially, ice could cut off water supply to hatchery. Removable sills would alleviate some of this problem by allowing spring run-off to remove sediment build-up upstream of sill. This would deepen channel and allow floating ice and slush to pass rather than be taken in.

Adult holding ponds are supplied with re-use water. A separate water source using single pass water is needed.

The Sawtooth Hatchery adult trap needs to be rebuilt so the floor of the trap can be raised and lowered. This modification is currently scheduled for completion in 1990.

Fish suffer sunburn problems. Baffles for outside raceways would ease this problem, reduce stress, help clean raceways, and allow better fish dispersal.

The several research projects needing marked fish disrupt normal hatchery production. A high percentage of hatchery production is being coded wire tagged.

Theoretical Production

Theoretical production based on the flow method is 120,488 pounds and with density is 96,390 pounds. Average production was 48,731 pounds and the 1987 agency goal is 96,000 pounds. Theoretical calculations were computed for spring chinook as follows:

Flow Method

1.5 X 1,125 gpm X 5.1" X 14 ponds = 120,488 lbs

Density Method

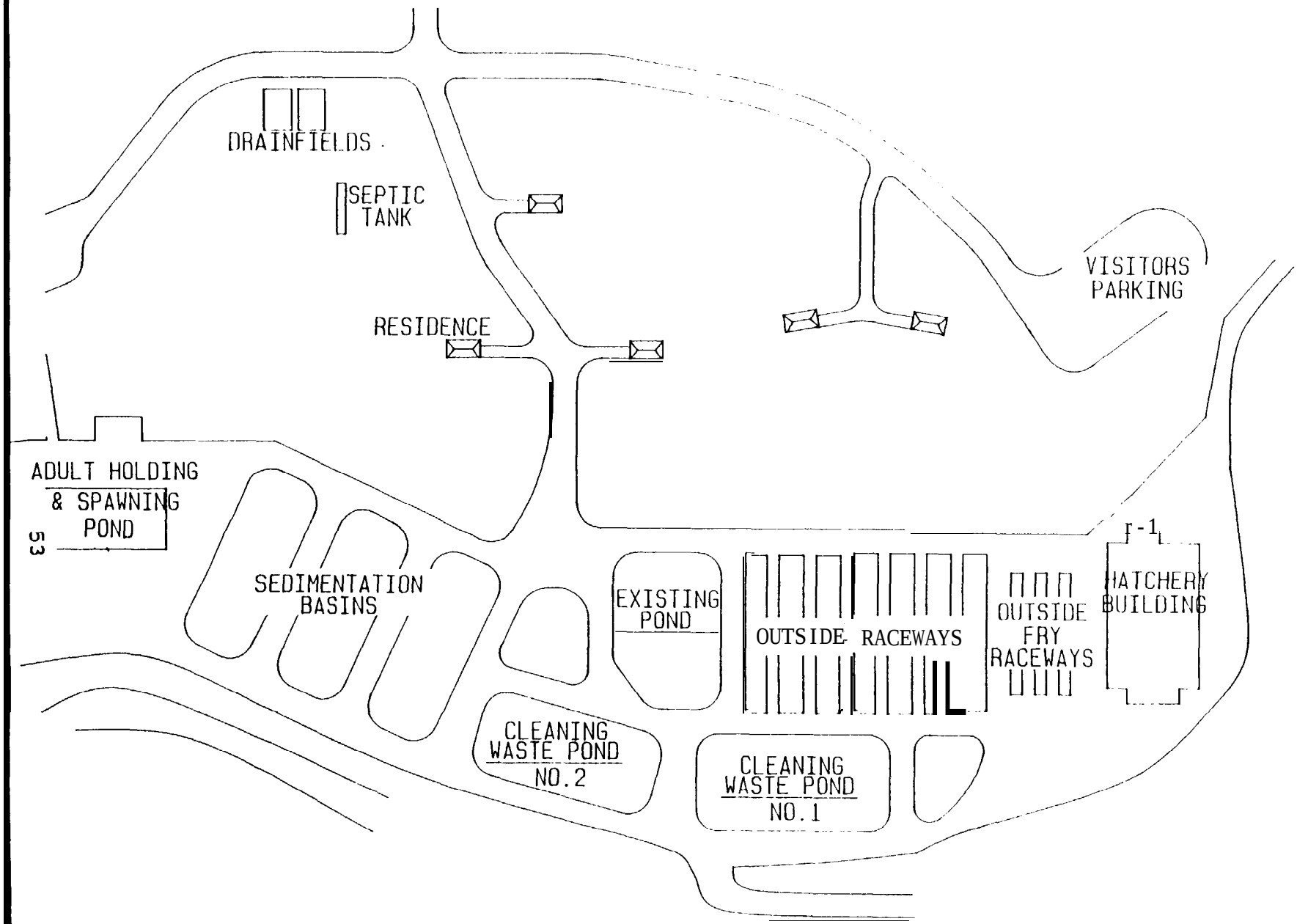
.25 X 5,400 cu ft X 5.1" X 14 ponds = 96,390 lbs

Comparison between the 2 theoretical calculations indicates that pond space may be the limiting factor in production. The agency goal and the theoretical density calculation are essentially the same. This facility is fairly new and production capacity should be considered to be the agency goal until adult return results are analyzed from several release years.

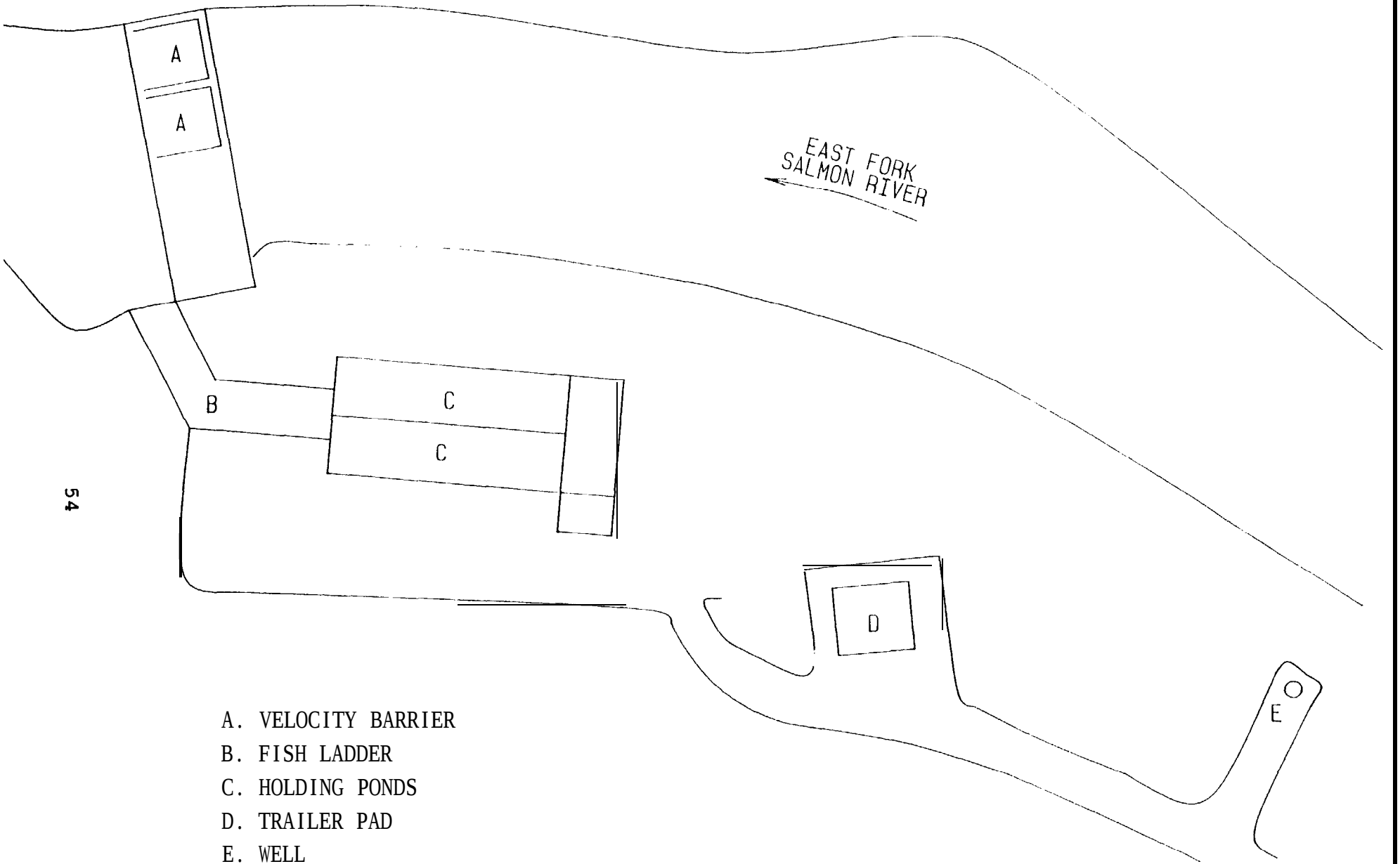
Hatchery Expansion capability

The hatchery is situated on 84.19 acres owned by the USFWS. Approximately 71% is being utilized. The remaining land is suitable for expansion. Additional land adjacent to the hatchery is also suitable for expansion but its availability is unknown. Additional Salmon River water is present in quantities which would be required for expansion. Three-wells are currently in production and additional ones could probably be drilled.

Hatchery facilities could be expanded north of the existing raceways on hatchery property. There is room to construct 6 raceways (3 pair) each 100' X 12' X 3'. Sufficient water to operate them is available. These raceways could produce 550,000 spring chinook smolts weighing 22,000 pounds.



SAWTOOTH HATCHERY SITE PLAN



A. VELOCITY BARRIER
B. FISH LADDER
C. HOLDING PONDS
D. TRAILER PAD
E. WELL

EAST FORK--\ SALMON RIVER SATELLITE FACILITIES

LITERATURE CITED

Piper, Robert G., Ivan B. McElwain, Leo E. Orme, Joseph P. McCararen, Laurie G. Fowler, and John R. Leonard. 1982. Fish Hatchery Management. United States Department of the Interior, Fish and Wildlife Service, Washington, D.C. 517 p.

Washington, Dr. Percy, Survey of Artificial Production of Anadromous Salmonids in the Columbia River Basin. November 1985. Final Report Submitted to the Bonneville Power Administration, Contract No. DE-AI-7984BP17100, Project No. 84-51. Copies available from Bonneville Power Administration, Division of Fish and Wildlife, Public Information Officer - PJ, P.O. Box 3621, Portland Oregon 97208. 221 p.

Summary Tables

For

Idaho Department of Fish and Game

Summary Table 1. List Of Hatcheries, Staffing Levels, And Operation And Maintenance Costs For All Facilities Operated By The Idaho Department Of Fish And Game Which Produce Anadromous Fish In The Columbia River Basin.

Hatchery	Staffing in FTE's	Operation and Maintenance Costs 1985	1986	1987
Magic Valley	4.0			543,200
McCall	5.25	231,364	260,600	277,200
Niagara Springs	4.92	253,175	267,077	255,628
Oxbow	1.58	37,000	33,000	34,500
Pahsimeroi	3.33	90,490	117,762	130,838
Powell Satellite	1.6			
Rapid River	5.92			
Red River Satellite	2.7	10,004	10,864	
Sawtooth	11.41	140,269	432,644	662,879

Summary Table 2. The Initial Year Hatchery Operated, Land Available, Percent Of Land In Use, And Land Ownership For Facilities Operated By The Idaho Department Of Fish And Game Which Rear Anadromous Fish In The Columbia Columbia River Basin.

Hatchery	Initial Year of Operation	Land Available Acres	% in Use	Land Ownership
Magic Valley	1987	25.46	100	USFWS
McCall	1979	15	100	USFWS
Niagara Springs	1966	45.3	100	Idaho Power Co.
Oxbow	1961	4	25	Idaho Power Co.
Pahsimeroi, Lower	1969	16.46		Idaho Power Co.
Pahsimeroi, Upper		9.9		Idaho Power Co.
Powell Satellite	1989	7.77	100	USFS
Rapid River	1964	35.3	100	Idaho Power Co.
Red River Satellite	1977	6.29	100	USFS
Sawtooth	1985	84.19	71	USFWS

Summary Table 3. List Of The Existing Rearing facilities For Each Hatchery Operated By The Idaho Department Of Fish And Game Which Produces Anadromous Fish In The Columbia River Basin. Figures For Length, Width, And Depth Are listed In Feet And Volumes Are Given In Cubic Feet.

Hatchery / Rearing Unit	Unit Dimension Length	Width	Depth	Unit Volume	No. of Units	Total Volume	Construction Material	Rearing Units Age	Condition	Comments
Magic Valley										
Raceuays	206	10	2.9	5,974	32	191,168	Concrete	2	Good	
Starting Raceways	39	4	2.75	429	20	8,580	Concrete	2	Good	
Upwelling Incubators		1	1.33		40		Clear Plexiglas	2	Good	27" height
McCall										
F.A.L Vert. Incubator					160		Plastic	1	Excellent	8 Trays/stack
Heath Vert. Incubator					192		Fiberglas	11	Fair	8 Trays/stack
Rearing Ponds	196	40.5	3	23,814	2	47,628	Concrete	11	Good	
Starting Raceuays	40	4	2	320	14	5,120	Concrete	11	Good	
McCall Satellite										
Adult Holding Pond	90	10	4.5	4,050	2	8,100	Concrete	12	Good	Adults only
Niagara Springs										
Circular Tanks		6		76	20	1,520	Fiberglas	10	Good	
Raceways	300	10	2.5	7,500	14	105,000	Concrete		Fair	250K lb design
Upwell Incubators					20		Aluminum		Fair	1.28 cu ft each
Oxbow										
Heath Vert. Incubators					224		Fiber./Plastic	3-8	Good-Poor	14 double stacks
Holding Ponds	105	29.5	5	15,487	2	30,974	Concrete	28	Fair-Good	Repairs needed
Holding Ponds	54	29.5	5	7,965	2	15,930	Concrete	28	Fair-Good	Repairs needed
Raceways	100	6	2.25	1,350	6	8,100	Cinder Blk/Cement	20	Very Poor	5 are unusable
Starter Vats	7.5	2	.a3	12	2	24	Fiberglas	10	Good	Unusable
Starter Vats	15.5	2	.67	21	5	105	Fiberglas	10	Good	4 are usable
Pahsimeroi										
Heath Vertical Incubator					320		Fiberglas	20	Good	8 trays per stack
Raceways	94.7	4	2.1	795	4	3,180	Concrete	8	Good	Lower Facility
Rearing Pond	285	48	3.5	47,880	2	95,760	Dirt	20	Good	Upper Facility
Powell Satellite										
Adult Holding Pond	100	12	7.5	5,700	2	11,400	Concrete	1	Excellent	
Rearing Pond	160	65	5	52,000	1	52,000	Concrete/Plastic	1	Excellent	
Rapid River										
Heath Vert. Incubators					768		Fiber./Plastic	23	Good	8 trays per stack
Holding Pond 1	80	25	4	8,000	1	8,000	Concrete	25	Fair	Chain Link Divider
Holding Pond 2	150	40	4	24,000	1	24,000	Dirt	23	Poor	
Holding Pond 3	250	80	4	80,000	1	80,000	Dirt	19	Poor	Full of silt
Raceways	90	6	3	1,620	12	19,440	Concrete	23	Fair	11 are usable
Rearing Pond 1	193.7	100	3.58	69,345	1	69,345	Dirt	23	Poor	Eddies/poor flow
Rearing Pond 2A, 2D	197.3	335	3.41	23,551	2	47,102	Cement Watts/Dirt	3	Good	
Rearing Pond 2B, 2C	171.4	39.5	3.41	23,087	2	46,174	Cement Walls/Dirt	3	Good	Width varies

Summary Table 3. Continued

Hatchery	Rearing Unit	Unit Dimension Length	Width	Depth	Unit Volume	No. of Units	Total Volume	Construction Material	Rearing Units Age	Condition	Comments
Red River Satellite											
	Adult Holding Raceways	42	10	6	2,520	2	5,040	Concrete	3	Excellent	
	Rearing Pond	340	280	5	476,000	1	476,000	Dirt	12	Poor	
Sawtooth											
	Adult Holding Ponds	167	16	5		3	13,360	Concrete	5	Good-Fair	They expand/contract
	F.A.L Vert. Incubator					800		Fiber./Plastic	5	Good	100 stacks
	Inside Starting Tanks	38.5	4	2.6	400	16	6,400	Concrete	5	Good	Baffles installed
	Raceways, Fry	93	6	2.5	1,395	6	8,370	Concrete	5	Good	
	Raceways, Large	193	12	2.33	5,400	14	75,600	Concrete	5	Good	
Sawtooth, East Fk Trap											
	Adult Holding Pond										

Summary Table 4. Water Right Information And Water Available Which Delivery System Can Supply For Use At Each Hatchery Operated By The Idaho Department Of Fish And Game Which Rear Anadromous Fish In The Columbia River Basin.

Hatchery Permit #	Water Source	Date	Water Right GPM	Water Available in GPM During Year Low Flow	High Flow	Average Flow	Comments
Magic Valley							
36-7033 7164	Crystal Springs		56,315	45,900	56,315	51,000	Fish Culture
		Total	56,315	45,900	56,315	51,000	
McCall							
65-12126	Payette Lake	06/26/78	8,977	8,977	8,977	8,977	Fish Culture
		Total	8,977	8,977	8,977	8,977	
McCall Satellite							
77-7078	S.F. Salmon River	09/04/79	8,977			8,977	Fish Culture
		Total	8,977	0	0	8,977	
Niagara Springs							
32711/36-2704	Spring	01/31/66	59,246	59,246	59,246	59,246	Fish Culture
		Total	59,246	59,246	59,246	59,246	
Oxbow							
46410	Snake River		59,246		60,592	22,891	Used Only For Adult Trap
	Snake River			9,197	9,197	9,197	Fish Cult/Adult Holding
	Well						Domestic Only, 70 gpm
		Total	59,246	9,197	69,789	32,088	Water Right Held By IPC
Pahsimeroi, Lower							
73-7055	Pahsimeroi River	04/01/81	17,953	17,953	17,953	17,953	Used Only March-Nov
Pi-7006	Pahsimeroi River	08/01/69	17,953				Used Only Dec.-Feb.
73-7051	Spring	03/28/69	224	224	224	224	Incubation Water
		Total	36,130	18,177	18,177	18,177	
Pahsimeroi, Upper							
33431-73-2168	Pahsimeroi River	01/20/67	4,488	2,244	3,591		Used In Rearing Ponds
73-7051	Pahsimeroi River	04/01/81	4,488	2,244	3,591		Used In Rearing Ponds
		Total	8,976	4,488	7,182	0	
Powell Satellite							
	Lochsa River		1,795		1,795	1,795	July 1 to Sept. 30
	Walton Creek		3,142	2,244	3,142	3,142	June 1 to Oct. 30
		Total	4,937	2,244	4,937	4,937	

Summary Table 4. Continued

Hatchery Permit #	Water Source	Date	Water Right GPM	Water Available in GPM During Year Low Flow	High Flow	Average Flow	Comments
Rapid River							
78-7013	Rapid River	08/01/86	8,348	6,732	8,348	8,079	Used in Adult Trap
31918	Rapid River	05/15/64	12,567	5,386	12,567	12,567	Used For Fish Culture
31914	Well	05/28/64	112				Domestic Use Only
		Total	21,027	12,118	20,915	20,646	
Red River Satellite							
A82-07156	S. Fk. Red River		2,244				Both Water Rights Are
A82-07048	S. Fk. Red River		2,244	1,122	2,244	1,795	Only Good For Months Of
		Total	4,488	1,122	2,244	1,795	June Through October
Sawtooth							
A71-07079	Salmon River	04/23/82	15,709	15,709	15,709	15,709	
71-7078	Well	08/01/82	135				Domestic Use Only
71-7078	Wells	08/01/82	4,039	3,500	3,500	3,500	
		Total	19,883	19,209	19,209	19,209	
Sawtooth, East Fk. T							
A72-07185	E. Fk Salmon R.	04/23/82	6,732	6,732	6,732	6,732	
		Total	6,732	6,732	6,732	6,732	

Summary Table 5. Summary Of Water Use By Hatcheries Operated By The Idaho Department Of Fish And Game Which Rear Anadromous Fish In The Columbia River Basin. Flow Is Listed In Gallons Per Minute (GPM) And Temperature Is Listed In Degrees Fahrenheit.

Hatchery Water Source	Delivery Method	Average Flow	Average Temp.	High Flow Volume	High Flow Month	Low Flow Volume	Low Flow Month	Highest Water Temp.	Highest Water Month	Lowest Water Temp.	Lowest Water Month
Magic Valley											
Crystal Springs	Gravity	51,000	58	56,315	October	45,900	April	58	Constant	58	Constant
McCall											
Payette Lake	Gravity	8,977	43	8,977	Constant	8,977	Constant	53	July	37	Jan.-March
McCall Satellite											
S.F. Salmon River	Gravity	8,977	55					70	August	43	June
Niagara Springs											
Spring	Gravity	59,246	58	59,246	Constant	59,246	Constant	58	Constant	58	Constant
Oxbow											
Snake River	Pump	22,891	54	60,592	No limit		No limit	76	August	33	February
Snake River	Pump	9,197	54	9,197	Constant	9,197	Constant	76	July	33	Jan.-Feb.
Well	Pump										
Pahsimeroi, Lower											
Pahsimeroi River	Grav/Pum	17,953	48	17,953	Constant	17,953	Constant	67	July	32	January
Pahsimeroi River	Grav/pump		48		Constant		Constant	67	July	32	January
Spring	Pumped	224	54	224	Constant	224	Constant	55	Sumner	52	Winter
Pahsimeroi, Upper											
Pahsimeroi River	Gravity		47	3,591	Constant	2,244	Constant	64	July	32	January
Pahsimeroi River	Gravity		47	3,591	Constant	2,244	Constant	64	July	32	January
Powell Satellite											
Lochsa River	Pumped	1,795	52	1,795	August			60	August	38	October
Ualton Creek	Gravity	3,142	49	3,142	June	2,244	August	58	August	38	October
Rapid River											
Rapid River	Gravity	8,079	44	8,348		6,732		65	Summer	32	
Rapid River	Gravity	12,567	44	12,567		5,386		65	Summer	32	
Red River Satellite											
S. Fk. Red River	Gravity	1,795	56	2,244	June	1,122	August	69	August	38	October

Summary Table 5. Continued

Hatchery Water Source	Delivery Method	Average Flow	Average Temp.	High Flow Volume	High Flow Month	Low Flow Volume	Low Flow Month	Highest Water Temp.	Highest Water Month	Lowest Water Temp.	Lowest Water Month
Sawtooth											
Salmon River	Gravity	15,709	50	15,709	Constant	15,709	Constant	68	August	32	Jan.-Feb.
Wells	Pumped	3,500	45	3,500	Constant	3,500	Constant	50	August	40	Jan.-Feb.
Sawtooth, East Fk. Trap											
E.F. Salmon River	Gravity	6,732	50	6,732	Constant	6,732	Constant	62	August	32	March

Summary Table 6. Adult Return Information For Hatcheries Operated By The Idaho Department Of Fish And Game Which Rear Anadromous Fish In The Columbia River Basin. Adult Holding Inflou Is Given In Gallons Per Minute (CPM).

Hatchery Species Stock	Brood Year	Adult Inflou	Holding Period	Adult Returns Males	Females	Jacks	Total	# Females Spawned	Adult Morts.	Adult Releases
McCall Satellite										
Summer Chinook										
S. Fk. Salmon River	1983	4,488	June-Sept	193	240	504	937	180		105
S. Fk. Salmon River	1984	4,488	June-Sept	431	503	595	1,529	352		337
S. Fk. Salmon River	1985	4,488	June-Sept	514	896	828	2,238	477	279	651
oxbou										
Spring Chinook										
Rapid River	1983	4,488	May- June	16			16			
Rapid River	1984	4,488	May- June	0	0	0	0			
Rapid River	1985	4,488	May-June	0	673	60	733			
Summer Steethead										
A Run	1984	4,488	Oct.-May				1,116	279		657
A Run	1985	4,488	Oct.-May	481	862		1,343	700		
A Run	1986	4,488	Oct. -May				2,438	332	312	
Pahsimeroi										
Spring Chinook										
Rapid River	1983	5,970	June-Sept	125	100	7	232	75		
Rapid River	1984	5,970	June-Sept	61	47	101	209	32		
Rapid River	1985	5,970	June- Sept	783	868	507	2,158	642	206	668
Sumner Chinook										
Pahsimeroi	1983	5,970	July-Oct.	44	57	8	109	45		
Pahsimeroi	1984	5,970	July-Oct.	18	a	11	37	4		
Pahsimeroi/SF Salmon	1985	5,970	July-Oct.	53	30	27	110	24		
Sumner Steelhead										
Pahsimeroi	1984	5,970	March-May	5,804	7,980			942		10,928
Pahsimeroi	1985	5,970	March-May	1,514	3,430		4,944	1,531	21	2,950
Pahsimeroi	1986	5,970	March-May	1,879	2,626		4,505	1,011	20	2,963
Rapid River										
Spring Chinook										
Rapid River	1983	4,488	June-Sept	820	1,044	94	1,958	859	290	
Rapid River	1984	4,488	June-Sept	809	896	651	2,356	821	125	
Rapid River	1985	4,488	June-Sept	3,030	3,346	351	6,727	2,962	523	
Red River Satellite										
Spring Chinook										
Red River	1983	1,346	June- Sept	65	73	0	138	30		
Red River	1984	1,346	June- Sept	44	65	2	111	49		
Red River	1985	1,346	June- Sept	55	69	2	126		126	

Summary Table 6. Continued

Hatchery Species Stock	Brood Year	Adult Inflow	Holding Period	Adult Returns Males	Females	Jacks	Total	# Females Spawned	Adult Morts.	Adult Releases
Sawtooth										
Spring Chinook										
East Fork	1984	3,366	June-Sept	54	41	22	117	25		65
East Fork	1985	3,366	June-Sept	190	63	50	303	44		142
Sawtooth	1983	4,100	June-Sept	170	179	17	366	128		97
Sautooth	1984	4,100	June-Sept	i43	187	76	406	100		205
Sawtooth	1985	4,100	June-Sept	786	557	296	1,639	313		625
Sumner Steelhead										
East Fork B Run	1984	3,366	April-May	22	la		40	0		40
East fork B Run	1985	3,366	April-May	47	30		77	20		0
East Fork B Run	1986	3,366	April-May	266	177		443	215		465
Sautooth A Run	1985	3,366	March-May	149	377		526	285		206
Sawtooth A Run	1986	3,366	March-May	1,271	941		2,212	619		1,056

Summary Table 7. Total Egg Take And Fish Ponded For Hatcheries Operated By The Idaho Department Of Fish And Game Which Rear Anadromous Fish In The Columbia River Basin.

Hatchery / Species / Stock	# Female Spawned	Spawning Dates Begin	End	Release Year	Egg Take	Egg Transfers In	Egg Transfers out	Fingerlings Ponded No.	Fingerlings Ponded Date	Transfer Of Fish In
McCall Satellite										
Sumner Chinook										
S. Fk. Salmon River	180	07/12/83	09/06/83	1985	750,000			566,000	May 1984	
S. Fk. Salmon River	352	07/05/84	09/04/84	1986	1,526,832			1,151,438	May 1985	
S. Fk. Salmon River	477	06/20/85	09/03/85	1987	2,073,546		200,328	1,246,323	May 1986	
Oxbow										
Sumner Steelhead										
A Run	279	03/25/84	05/02/84	1985	1,313,668			385,808		
A Run	700	04/01/85	05/13/85	1986	2,974,362			165,261		
A Run	332	03/20/86	04/08/86	1987	1,315,999			97,000		
Pahsimeroi										
Spring Chinook										
Rapid River	75	08/11/83	09/16/83	1985	279,398			195,963	April 1984	
Rapid River	32	08/02/84	09/10/84	1986	145,341			89,502	April 1985	
Rapid River	642	08/24/85	09/20/85	1987	2,602,404			502,000	April 1986	
Sumner Chinook										
Pahsimeroi	45	08/30/83	10/08/83	1985	261,188			231,263	April 1984	
Pahsimeroi	4	08/06/84	09/17/84	1986	23,990			13,373	April 1985	
Pahsimeroi/SF Salmon	24	09/09/85	10/05/85	1987	127,332	200,448		288,900	April 1986	
Summer Steelhead										
Pahsimeroi	942			1985						
Pahsimeroi	1,531									
Pahsimeroi	1,011									
Rapid River										
Spring Chinook										
Rapid River	859	08/08/83	09/09/83	1985	3,449,471			2,889,729		
Rapid River	821	08/08/84	09/14/84	1986	3,125,911			2,570,199		
Rapid River	2,962	08/13/85	09/15/85	1987	12,773,028		6,616,427	4,673,915		
Red River Satellite										
Spring Chinook										
Red River	30	08/26/83	09/12/83	1985	128,196		128,826		July 1984	80,000
Red River	49	08/07/84	09/05/84	1986	217,181		217.181		June 1985	152,000

Summary Table 7. Continued

Hatchery Species Stock	# Female Spawned	Spawning Dates Begin	End	Release Year	Egg Take	Egg Transfers In	out	Fingerlings No.	Ponded Date	Transfer Of Fish In
Sawtooth										
Spring Chinook										
East Fork	25	08/07/84	08/28/84	1986	171,308		159,316			108,700
East Fork	44	08/06/85	08/30/85	1987	245,175			200,100		
Rapid River				1987		2,535,639		1,555,400		
Sawtooth	128	08/05/83	08/31/83	1985	650,196		538,132			420,060
Sawtooth	100	07/07/84	09/06/84	1986	601,671		481,337			347,500
Sautooth	313	08/05/85	09/02/85	1987	1,418,920			1,210,000		
Sumner Steelhead										
East Fork B Run	20	04/06/85	05/09/85	1986	129,700		117,700			18,800
East Fork B Run	215	03/20/86	04/17/86	1987	1,460,000		1,212,000			339,500
Sawtooth A Run	285	04/06/85	05/02/85	1986	1,618,700		1,374,200			2,188,182
Sawtooth A Run	619	03/25/86	04/22/86	1987	2,766,000		2,367,000			1,433,700

Summary Table 8. Releases And Production Goals For Each Hatchery Operated By The Idaho Department Of Fish And Game Which Reared Anadromous Fish In The Columbia River Basin In 1985.

Hatchery / Species / Stock	Smolt Releases No.	Smolt Releases Lbs.	Fingerling Releases No.	Fingerling Releases Lbs.	Transfers No.	Transfers Lbs.	Smolt Production Goal No.	Smolt Production Goal Lbs.	Nonsmolt Goal No.	Nonsmolt Goal Lbs.
McCall										
Summer Chinook										
S. Fk Salmon River	564,405	29,550	100,149	918			500,000	25,000		
TOTAL	564,405	29,550	100,149	918	0	0	500,000	25,000	0	0
Niagara Springs										
Summer Steelhead										
A Run	1,687,894	290,400	330,120	12,955			1,800,000	400,000		
TOTAL	1,687,894	290,400	330,120	12,955	0	0	1,800,000	400,000	0	0
Oxbow										
Summer Steelhead										
A Run			140,736	75						
TOTAL	0	0	140,736	75	0	0	0	0	0	0
Pahsimeroi										
Spring Chinook										
East Fork			120,960	270						
Rapid River	178,782	12,080								
Sawtooth					346,482	746				
Summer Chinook										
Pahsimeroi	209,155	13,072					1,000,000	62,500		
S-r Steelhead										
A Run			3,011,000	1,478						
TOTAL	387,937	25,152	3,011,000	1,478	467,442	1,016	1,000,000	62,500	0	0
Rapid River										
Spring Chinook										
Rapid River	2,928,598	97,430	152,000	760			3,000,000	150,000		
TOTAL	2,928,598	97,430	152,000	760	0	0	3,000,000	150,000	0	0
Red River Satellite										
Spring Chinook										
Red River	80,000	3,636					300,000	12,000		
TOTAL	80,000	3,636	0	0	0	0	300,000	12,000	0	0

Summary Table 8. Continued

Hatchery / Species	Stock	Smolt Releases No.	Smolt Releases Lbs.	Fingerling Releases No.	Fingerling Releases Lbs.	Transfers No.	Transfers Lbs.	Smolt Production Goal No.	Smolt Production Goal Lbs.	Nonsmolt Goal No.	Nonsmolt Goal Lbs.
Sautooth											
Spring Chinook											
	Sawtooth	420,060	16,156					1,400,000	56,000		
Sumner Steelhead											
	A Run			2,188,160	951						
	B Run			18,822	8						
	TOTAL	420,060	16,156	2,206,982	959	0	0	1,400,000	56,000	0	0

Summary Table 9. Releases And Production Goals For Each Hatchery Operated By The Idaho Department Of Fish And Game Which Reared Anadromous Fish In The Columbia River Basin In 1986.

Hatchery / Species	Stock	Smolt Releases No.	Smolt Releases Lbs.	Fingerling Releases No.	Fingerling Releases Lbs.	Transfers No.	Transfers Lbs.	Smolt Production Goal No.	Smolt Production Goal Lbs.	Nonsmolt Goal No.	Nonsmolt Goal Lbs.
McCall											
Sumner Chinook											
	S. Fk Salmon River	970,348	45,450	177,606	276			1,000,000	50,000		
	TOTAL	970,348	45,450	177,606	276	0	0	1,000,000	50,000	0	0
Niagara Springs											
Sumner Steelhead											
	A Run	1,679,853	326,930	39,995	1,900			1,800,000	400,000		
	TOTAL	1,679,853	326,930	39,995	1,900	0	0	1,800,000	400,000	0	0
Oxbow											
Sumner Steelhead											
	A Run			94,700	27						
	TOTAL	0	0	94,700	27	0	0	0	0	0	0
Pahsimeroi											
Spring Chinook											
	Rapid River	80,948	4,906	321,596	2,235						
Sumner Chinook											
	Pahsimeroi	12,095	733					1,000,000	62,500		
Sumner Steelhead											
	A Run			2,793,050	1,228						
Sumner Steelhead											
	B Run			211,600	92						
	TOTAL	93,043	5,639	3,326,246	3,555	0	0	1,000,000	62,500	0	0
Rapid River											
Spring Chinook											
	Rapid River	1,734,688	79,486	1,187,317	3,165	152,000	760	3,000,000	150,000		
	TOTAL	1,734,688	79,486	1,187,317	3,165	152,000	760	3,000,000	150,000	0	0
Red River Satellite											
Spring Chinook											
	Red River	232,900	8,157					300,000	12,000		
	TOTAL	232,900	8,157	0	0	0	0	300,000	12,000	0	0

Summary Table 9. Continued

Hatchery Species	Stock	Smolt Releases No.	Smolt Releases Lbs.	Fingerling Releases NO.	Fingerling Releases Lbs.	Transfers No.	Transfers Lbs.	Smolt Production Goal No.	Smolt Production Goal Lbs.	Nonsmolt Goal No.	Nonsmolt Goal Lbs.
Sawtooth											
Spring Chinook											
	Eastfork	108,700	3,880					1,000,000	40,000		
	Rapid River	696,120	24,861								
	Sawtooth	347,500	13,365					1,400,000	56,000		
Sumner Steelhead											
	A Run			1,433,731	623						
	B Run			339,546	147						
	TOTAL	1,152,320	42,106	1,773,277	770	0	0	2,400,000	96,000	0	0

Summary Table 10. Releases And Production Goals For Each Hatchery Operated By The Idaho Department Of Fish And Game Which Reared Anadromous Fish In The Columbia River Basin In 1987.

Hatchery Species	Stock	Smolt Releases No.	Smolt Releases Lbs.	Fingerling Releases No.	Fingerling Releases Lbs.	Transfers No.	Transfers Lbs.	Smolt Production Goal No.	Smolt Production Goal Lbs.	Nonsmolt Goal No.	Nonsmolt Goal Lbs.
McCall											
Sumner Chinook											
	S. Fk Salmon River	958,300	47,425					1,000,000	50,000		
	TOTAL	958,300	47,425	0	0	0	0	1,000,000	50,000	0	0
Niagara Springs											
Sumner Steelhead											
	A Run	1,811,900	417,100	404,000	13,166			1,800,000	400,000		
	TOTAL	1,811,900	417,100	404,000	13,166	0	0	1,800,000	400,000	0	0
Pahsimeroi											
Spring Chinook											
	Rapid River	444,700	18,300								
Summer Chinook											
	Pahsimeroi	258,600	26,263					1,000,000	62,500	300,000	1,200
Sumner Steelhead											
	A Run			1,607,228	643						
	TOTAL	703,300	44,563	1,607,228	643	0	0	1,000,000	62,500	300,000	1,200
Rapid River											
Spring Chinook											
	Rapid River	2,939,400	129,374			552,792	425	3,000,000	150,000		
	TOTAL	2,939,400	129,374	0	0	552,792	425	3,000,000	150,000	0	0
Red River Satellite											
Spring Chinook											
	Red River	98,800	3,952					300,000	12,000		
	TOTAL	98,800	3,952	0	0	0	0	300,000	12,000	0	0
Sawtooth											
Spring Chinook											
	Eastfork	195,100	7,804					1,000,000	40,000		
	Rapid River	671,200	26,848								
	Sawtooth	1,184,600	51,144					1,400,000	56,000		
Sumner Steelhead											
	A Run			931,765	405						
	TOTAL	2,050,900	85,796	931,765	405	0	0	2,400,000	96,000	0	0

Summary Table 11. Production In Pounds During The Three Year Period 1985-1987 For Hatcheries Operated By The Idaho Department Of Fish And Game Which Reared Anadrcmous Fish In The Columbia River Basin. **Smolts** Include Pounds Of **Smolts** Released, Fingerling Includes Pounds Of Non-molting Fish Released, And Trans. Includes The Pounds Of Fish Transferred To Other Rearing Facilities.

Hatchery	1985			1986			1987			3 Year
Species Stock	Smolts	Fingerling	Trans.	Smolts	Fingerling	Trans.	Smolts	Fingerling	Trans.	Average
McCall										
Sumner Chinook										
S. Fk Salmon River	29,550	918		45,450	276		47,425			
	29,550	918	0	45,450	276	0	47,425	0	0	41,206
Niagara Springs										
Sum-war Steelhead										
A Run	290,400	12,955		326,930	1,900		417,100	13,166		
	290,400	12,955	0	326,930	1,900	0	417,100	13,166	0	354,150
Oxbow										
Summer Steelhead										
A Run		75			27					
	0	75	0	0	27	0	0	0	0	34
Pahsimeroi										
Spring Chinook										
East Fork			270							
Rapid River	12,080			4,906	2,235		18,300			
Sawtooth			746							
Summer Chinook										
Pahsimeroi	13,072			733			26,263			
Summer Steelhead										
A Run		1,478			1,228			643		
B Run					92					
	25,152	1,478	1,016	5,639	3,555	0	44,563	643	0	27,349
Rapid River										
Spring Chinook										
Rapid River	97,430	760		79,486	3,165	760	129,374		425	
	97,430	760	0	79,486	3,165	760	129,374	0	425	103,800

Summary Table 11. Continued

Hatchery Species Stock	1985 Smolts	1985 Fingerling	1985 Trans.	1986 Smolts	1986 Fingerling	1986 Trans.	1987 Smolts	1987 Fingerling	1987 Trans.	3 Year Average
Red River Satellite										
Spring Chinook										
Red River	3,636			8,157			3,952			
	3,636	0	0	8,157	0	0	3,952	0	0	5,240
Sawtooth										
Spring Chinook										
Eastfork				3,880			7,804			
Rapid River				24,861			26,848			
Sautooth	16,156			13,365			51,144			
Sumner Steelhead										
A Run		951			623			405		
B Run		8			147					
	16,156	959	0	42,106	770	0	85,796	405	0	48,731

Summary Table 12. Total Anadromous Fish Production (Includes Smolt And Fingerling Releases And Transfers), Theoretical Production In Pounds Calculated For Flow And Density Methods, And 1987 Agency Production Goals (Smolts Plus Fingerlings) For Hatcheries Operated By The Idaho Department Of Fish And Game In The Columbia River Basin.

Hatchery	Total Hatchery Production in Pounds 1985	1986	1987	Average	Theoret. Prod. Methods Flow	Density	1987 Agency Goal in Lbs
Magic Valley	0	0	0	0	462,215	401,453	0
McCall	30,468	45,726	47,425	41,206	73,289	62,154	50,000
Niagara Springs	303,355	328,830	430,266	354,150	629,606	223,125	400,000
oxbow	75	27	0	34	7,200	10,125	0
Pahsimeroi	27,646	9,194	45,206	27,349	79,476	17,007	63,700
Powell Satellite	0	0	0	0	17,258	7,956	0
Rapid River	98,190	83,411	129,799	103,800	153,037	24,393	150,000
Red River Satellite	3,636	8,157	3,952	5,248	6,947	67,830	12,000
Sawtooth	17,115	42,876	86,201	48,731	120,488	96,390	96,000
TOTAL	480,485	518,221	742,849	580,518	1,549,516	910,433	771,700

Summary Table 13. Anadromous Species Uhich Can Be Reared At Hatcheries Operated By The Idaho Department Of Fish And Game In The Columbia River Basin. An "O" Indicates Species Currently Being Reared And A "X" Designates Species Uhich Potentially Could Be Reared.

Hatchery	Fall Chinook	Spring Chinook	Summer Chinook	Coho	Steel head	Searun Cutthroat	Sockeye	Chum
Magic Valley	X	X	X		0			
McCall	X	X	0		X			
Niagara Springs	X	X	X		0			
Oxbow	X							
Pahsimeroi	X	0	0					
Rapid River	X	0	X					
Red River Satellite	X	D	X					
Sawtooth	X	0	X		0		X	

APPENDIX A

ADDRESSES AND PHONE NUMBERS

OF AGENCIES OPERATING ANADROMOUS FISH HATCHERIES

Appendix A. Addresses And Phone Numbers Of Agencies Which Operate Anadromous Fish Hatcheries In The Columbia River Basin.

Idaho Department Of Fish and Game PO Box 25 Boise, Idaho 93707	(206) 334-3791
Oregon Department Of Fish And Wildlife PO Box 59 Portland, Oregon 97207	(503) 229-5400
U.S. Fish And Wildlife Service 911 NE 11th Ave. Portland, Oregon 97232-4181	(503) 231-6119
Washington Department Of Fisheries 115 General Admin. Building Olympia, Washington 98501	(206) 234-6600
Washington Department Of Wildlife 600 N. Capital Way Olympia, Washington 98504	(206) 753-5710

APPENDIX B

DATA COLLECTION FORMS

HATCHERY SUMMARY

Hatchery Name: _____ Hatchery Code: _____

Operating Agency: _____

Funding Agency/Agencies: _____

Initial Year of Operation: _____ Current Date: _____

Address: _____ Phone Number: _____

_____ Hatchery Manager: _____

_____

_____

Facility and Operating Synopsis (Use continuation sheet if necessary):

SITE DATA

Hatchery Name: _____ Hatchery Code: _____

Location of Hatchery/:

Basin Subregion: River:

Tributary System to Mainstream:

Elevation of Hatchery in Feet:

Nearest Town:

Legal Covenants and Conditions:

Land Owner:

Land Area: Percent in use:

Terms of Lease (if any):

Easements / Rights of Way (if any):

Special Operation or Construction Permits:

Pollution Control Requirements / Permits:

Water Rights:

	Permit/ Certificate Number	Source	Purpose of Use	Priority Date	Amount
1.					
2.					
3.					
4.					
5.					

NOTE: Provide the above information for each Satellite location on a separate form and attach to corresponding hatchery. Include a brief description of each satellite's function in relation to the parent hatchery.

WATER SUPPLY SUMMARY

Hatchery: _____ Location Code: _____

	Source #l	Source #2	Source #3
Delivery (P/G)*			
Use			
Average Flow			
Average Temp.			
High Flow/Month			
Low Flow/Month			
High Temp./Month			
Low Temp./Month			

* Pumped or gravity

Comments:

Reuse System (Description):

NOTE: Attach a separate form for each satellite location.

FACILITY INVENTORY

Hatchery: _____ Hatchery Code: _____

	Type/ Dimensions	Usable Volume	Number	Age	Material	Condition	Comments
COMPONENT 1/:							
Incubation:							
Start Tanks:							
Raceways:							
Ponds:							

1/Correct for irregular shapes.

LAYOUT: Attach a layout drawing of the hatchery showing major features such as buildings, raceways, ponds, etc.

STAFFING SUMMARY

Hatchery: _____ Hatchery Code: _____

(Description of normal facility staffing practices. Include breakdown of full time, part time, and temporary staff by type of position/title.)

ADULT CAPTURING/HANDLING

Hatchery: _____ Hatchery Code: _____

Species: _____

Spawning:

Method of Adult Return to Site:

Ladder:
Off-site capture:
Other:

Adult Holding Pond:

Flow:
Volume:
Holding Density:

Method of Adult Holding:

Description of holding ponds:

Method of separating males and females:

Method of holding/handling with mixed species/stock returns:

Typical time of adult holding:

Spawning procedure:

Method of fertilization:

Hatchery Return Information

	# Returned	# Spawned	# Released *	# Other
Males	_____	_____	_____	_____
Females	_____	_____	_____	_____
Jacks	_____	_____	_____	_____
Total	_____	_____	_____	_____

*Note: Describe release strategy/goal:

HATCHERY PRODUCTION

Hatchery _____ Hatchery Code: _____
Species: _____
Stock: _____
Year: _____

A. Hatchery Production Goal: # Pre-Smolts: _____ Size: _____
Smolts: _____ Size: _____

B. Production Summary:

	Number	Startina Date	Ending Date
Egg Take:			
Egg Density:			
Incubation Method:			
Eyed Egg Count			
Fingerling Ponded:			
Density			

C. Number of Fish Released:

	Number	Pounds	Fish/Lbs	Dates	# Tagged Released
On Site:					
Off Site:					

HATCHERY PRODUCTION SUMMARY
FOR FISCAL YEARS 1985 TO 1987

Hatchery Name: _____ Hatchery Code: _____

Fiscal Year: _____

A. Total Releases For Hatchery By Species:

Species	Stock	# of Fish	Lbs of Fish
Total For The Year (All Species)			

B. Total Interim Production For Hatchery By Species:
(Fish reared for a period of time and transferred to other stations, increase in pounds during the period fish were on station)

Species	Stock	# of Fish	Lbs of Fish
Total For The Year (All Species)			

HATCHERY PRODUCTION SUMMARY
FOR FISCAL YEARS 1985 TO 1987

Hatchery Name: _____ Hatchery Code: _____

Fiscal Year: _____

C. Total Production For Hatchery By Species:
(Part "A" plus part "B")

Species	Stock	# of Fish	Lbs of Fish

Total For The Year (All Species) _____ _____

D. Total Operating Cost For Hatchery

cost: _____

PRODUCTION CONSTRAINTS

Hatchery: _____ Hatchery Code: _____

Describe Current Restraints to Production relating to:

Physical Hatchery Layout:

Water Sources/Supplies/Delivery System/Quality/Water Rights:

Adult Holding/Spawning Capabilities:

Egg Related Constraints:

Fish Rearing Constraints:

Administrative Constraints (ie. mixed species hatchery):

HATCHERY PRODUCTION SMOLT CAPACITY

Hatchery Name: _____ Hatchery Code: _____

Species	Actual Hatchery Production		Smolt Production Goal	
	Number	Pounds	Number	Pounds

Theoretical Production:

Piper's 1982 Flow Method:

Piper's 1982 Density Method:

HATCHERY EXPANSION CAPABILITY

Hatchery Name: _____ Hatchery Code: _____

Land:

Describe Land Available:

Land Ownership:

Water:

Quantity:

Amount Available (Actual or Potential):

Type: Ground: _____ Surface: _____

Description/Method of Acquisition:

Quality:

Temperature Range:

Possible Chemical Limitations:

Potential Disease Problems:

Feasibility:

Distance from Hatchery:

Availability of Water Right:

Type Delivery: Pump: _____ Gravity: _____

Type of Construction:

Estimate of Cost (use conceptual design information):

Description	cost
Land Acquisition:	
Construction:	
Water Related:	
O&M:	

Potential Smolt Production: